

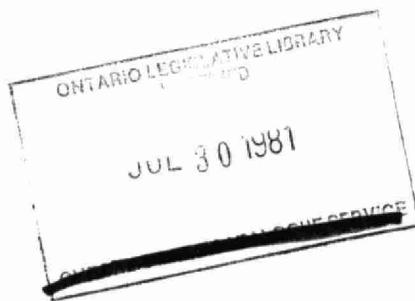
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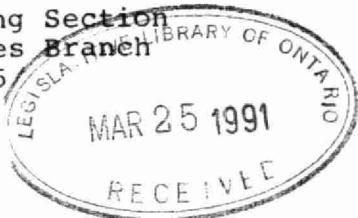
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NANTICOKE WATER CHEMISTRY

1974 REPORT



J. Polak
Lake Systems
Water Modelling Section
Water Resources Branch
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ABSTRACT

Two types of water quality surveys were done in 1974 in the Nanticoke area of Lake Erie. First, as in previous years, the samples were collected every month and analysed. The results were tested statistically for spatial and temporal variation and also compared with the other years' results. While the difference between the years is significant, not enough data are available to determine the long term trends generally. The exceptions are conductivity and pH where in the mean a slight decrease of the values was observed during the period 1969-1974.

The second type of survey employed an automatic monitoring station which recorded five chemical parameters every 30 minutes. The data served for evaluation of the sudden changes in parameters (stresses) as well as for calculation of the main periodicities and daily changes.

NANTICOKE WATER CHEMISTRY 1974 REPORT

INTRODUCTION

Study of water chemistry in the Nanticoke area of Lake Erie continued in 1974. As in previous years, water samples were collected in the area (nine stations) seven times during the months of April to December 1974. Water samples were analyzed for conductivity, turbidity, pH, various forms of nitrogen and phosphorus, iron, chlorides, sulphate, dissolved silica, dissolved solids and chlorophyll a. The design of the sampling grid and frequency of sampling was similar to previous years so a statistical comparison of water quality and its year to year changes could be determined. The year 1974 was the first operational year of the Ontario Hydro Nanticoke Generating Station, but due to technical difficulties, the station was operational for only part of the year.

In addition to the grab samplings, an automatic monitoring water quality station was installed and run for several days in August and October. Five parameters (temperature, conductivity, DO, pH, ORP) were recorded every 30 minutes during this time. This way any short term fluctuations and time changes in the parameters' could be determined.

SURVEY OPERATION

Grab Sampling

Nine stations, as shown in Figure 1, were located by transit and marked with spar buoys. The sampling stations were at the same locations as in the previous years. Samples at two depth levels near the surface and bottom were taken at most of the stations. At stations 518, 1008, and 1040 mid-depth samples only were collected. For chlorophyll a determinations composite depth samples were obtained by mixing bottom and surface samples. Analysis of samples were performed by MOE's main laboratory in Toronto.

In Situ Monitoring

During summer months of 1974 an automatic monitoring station consisting of two NERA model 4 monitors were operated at Nanticoke near Station 1040 (see Figure 1). The instruments recorded every 30 minutes the following parameters: temperature, conductivity, pH, dissolved oxygen, redox potential, and depth. The monitoring systems were placed into the water resistant compartments of the plank-on-edge (Braincon Corp.) surface buoy with the sensors lowered to an appropriate depth. An attempt was made to record simultaneously at two depth levels, but only a short common record in August was obtained. The review of the operation of the NERA monitors is given in Table 8.

ANALYSIS OF 1974 DATA

Results of the analysis of the samples collected are summarized in Tables 1 to 6. Means and standard deviations classified by days are given in Tables 1 and 2. Similar results compared by the stations are shown in Tables 3 and 4. Indices of variation defined as $100 \times \text{standard deviations/mean}$ are given in Tables 5 and 6.

The significance and variation due to the dates and stations was tested by a two-way analysis of variance technique with the results given in Table 7. As can be seen, there is in most cases, significant difference (at 0.05 probability) between dates for individual parameters (15 out of 18) while only four of the parameters show significant difference between different stations. There is no significant difference between nutrients and most of the chemical parameters at different stations and also some of the nutrients such as dissolved phosphorus, total organic nitrogen and total kjeldahl nitrogen are not significantly different on different dates.

As discussed, monitoring at 30 minute intervals was done by the NERA environmental monitor. Operational periods for which good data were obtained are listed in Table 8. Also on October 10, vertical profiling was done using the monitor at Stations 1040 and 810. No difference was found between the parameters measured at the different depth levels as no stratification existed on that day. From the data collected by NERA monitor, daily mean values and their standard deviations were calculated and are given in Table 9. In August 1974, two instruments were operated at two levels in a plan to record the chemistry in and under the thermal plume of the Ontario Hydro generating station. Operating schedule of the Ontario Hydro station is given in Table 10. Unfortunately, Ontario Hydro was shut down during that period and also the obtained records are very short. As can be seen from Table 9, there is some difference in the chemistry parameters at the two levels measured at the same time while the difference between the days at the same level is rather small.

The parameters were tested by the Kolmorgov-Smirnov distribution test (IBM, 1968) for the probability of being normally, exponentially or log-normally distributed. The results are presented in Table 11 and as can be seen none of the tested distributions prevailed throughout the record. This is in agreement with results previously reported (Palmer and Izatt, 1970). This finding has to be taken with caution as the records tested are relatively short and cover only a short part of the year. Nevertheless, the results of all statistical treatments based on normal distribution also have to be taken with caution.

To evaluate sudden changes in the recorded chemical and physical parameters, the maximum values of the time changes (gradient) over one and four hours were calculated for the available records and are shown in Table 12. Both the increases and the decreases are listed. In August the changes were generally larger in the top layer than in the lower layer, while in October the difference between the various levels was minimal. Also the changes over four hours, i.e. the mean change occurring over a four hour period of time is smaller than the change in a one hour period. Time gradients are an important measure of sudden changes in physical and chemical properties (stresses) and more investigation should be done on their influence on fauna and flora. The data obtained by the NERA monitor were subjected to a time series analysis to find the significant periodicities. The data sets were first filtered to remove white noise and also the long-period trends. The results of the analysis are shown in Table 13 where the significant spectral periods are listed for five parameters for each record obtained in 1974. For most of the parameters, there are few periodicities, the exception is conductivity recorded from August 7-9. There appears no diurnal periodicity of the parameters due possibly to the insufficient length of record and also the periodicities cannot be explained by lake free oscillations (theoretical values of Rockwell (1966)).

CHANGES IN WATER CHEMISTRY DURING THE YEARS 1969-1974

Some of the chemical parameters were monitored several times a year from 1969 to 1974 and the possible change in their values during those years should be examined. The results of two-way analysis of variance for conductivity, pH, turbidity, total P and total N are given in Table 14. Apparently, for the years 1970-74, the between the years change are significant while the difference between the stations is significant only for turbidity. In Figure 2, the mean values of conductivity and their 95 percent confidence limits are depicted for individual days when the samples were collected, from 1969 to 1974. Considerable variation between the individual surveys is readily apparent. Usually conductivity reaches its minimum in late summer increasing again before winter. Mean slope for all points shown in Figure 1 was calculated by the least square method and is shown as a full line. The broken lines show the 95 percent confidence limit of the slope. As can be seen, there is positively a decline of conductivity between these years with a mean value of 3.0 $\mu\text{mhos}/\text{cm}/\text{year}$. Straight line change is only an approximation. Actually, the properties are changing periodically and while the mean change of the property over the years can be calculated it does not mean that the same change occurs every month. Instead, the

periodic changes take place as can be seen on Figure 2. To determine the actual periodicities more and longer period data are required.

Similarly, four other parameters, pH, turbidity, total P and total N were analyzed with results shown in Figures 3 to 6 and Table 15. From those, only pH has been decreasing within a 95 percent probability level. Others may be decreasing as well as increasing within the same probability level and longer records are required to determine the changes.

CONCLUSIONS

There is a significant year to year difference in chemistry data in Nanticoke. For conductivity and pH there was a mean yearly decrease of the value from 1969 to 1974 of 3.0 $\mu\text{mhos}/\text{cm}$ and 0.07 SU while for turbidity, total P and total N the trend cannot be determined within a 95 percent confidence level. The lake region covered by the surveys from 1969 to 1974 was, with the exception of turbidity, found to have no significant differences in water quality among the stations. On the other hand, the difference between the years and seasonal variations are significant.

REFERENCES

IBM (1970) System/360 Scientific Subroutine Package (360A-CM-03X) Version III, H20-0166-5. International Business Machines Corp., White Plains, N.Y. 10604.

Palmer, M.D., Izatt, J.B. (1970). Determination of Some Chemical and Physical Relationship from Recording Meters in Lakes. *Water Research* 4, 773.

Rockwell (1966). Theoretical Free Oscillation of the Great Lakes. Univ. of Chicago, Dept. of Geophysical Sci., Technical Report 20.

TABLE 1: Summary of Results, Mean Value per Date, 1974, Nanticoke Water Chemistry

DATE		Temp °C	Cond μhos/cm	Turb FTU	pH SU	Total P mg/l	Diss P mg/l	Tot N N-mg/l	Tot Kjeld N-mg/l	Tot Org N-mg/l	NO ₃ N-mg/l	NO ₂ N-mg/l	NO _x N-mg/l	Tot Iron mg/l	Chloride mg/l	Sulphate SO ₄ -mg/l	Diss Si SiO ₂ -mg/l	Diss Solids mg/l	Chlorophyll A - mg/l
Apr 24	A	5.2	313	2.9	7.4	0.013	0.005	0.492	0.27	0.266	0.206	0.003	0.018	0.18	22.9	-	-	204	0.9
	B	4.9	312	2.1	7.6	0.013	0.005	0.506	0.29	0.266	0.212	0.006	0.022	0.12	22.8	-	-	203	-
May 7	A	6.2	-	3.4	7.8	0.017	0.016	0.636	0.40	0.362	0.125	0.003	0.015	0.16	23.4	-	-	228	0.9
	B	6.5	-	5.0	7.9	0.020	0.009	0.545	0.31	0.300	0.220	0.003	0.010	0.15	23.3	-	-	228	-
May 22	A	13.1	309	7.8	8.1	0.030	0.012	0.564	0.32	0.275	0.227	0.007	0.040	0.37	22.8	-	-	201	1.6
	B	10.6	310	8.6	8.0	0.027	0.015	0.530	0.28	0.256	0.246	0.007	0.021	0.39	22.9	-	-	202	-
Jun 18	A	13.0	303	4.6	7.5	0.019	0.005	0.462	0.30	0.286	0.159	0.003	0.014	0.22	20.0	26.0	0.88	202	1.8
	B	12.0	310	5.2	7.7	0.022	0.005	0.448	0.29	0.273	0.159	0.003	0.013	0.27	20.0	26.0	0.91	202	-
Jul 5	A	15.1	310	3.8	8.0	0.012	0.005	0.412	0.25	0.216	0.155	0.005	0.036	0.25	19.3	25.0	0.22	202	0.9
	B	12.2	310	2.6	8.1	0.014	0.006	0.455	0.26	0.214	0.191	0.005	0.045	0.21	19.2	25.4	0.23	202	-
Jul 30	A	20.5	311	1.7	8.3	0.018	0.006	0.480	0.33	0.320	0.147	0.005	0.008	0.13	23.2	27.2	0.43	202	1.1
	B	17.8	313	1.6	8.2	0.022	0.008	0.509	0.33	0.336	0.176	0.007	0.014	0.13	23.4	27.4	0.58	203	-
Aug 27	A	22.6	305	2.1	7.7	-	-	-	-	-	-	-	0.14	22.5	21.8	-	-	0.5	
	B	22.0	306	0.9	7.8	-	-	-	-	-	-	-	0.13	22.5	22.2	-	-	1.5	
Sep 24	A	15.3	305	1.1	8.2	0.017	0.007	0.319	0.30	0.288	0.011	0.006	0.010	-	20.4	-	-	-	1.3
	B	15.2	305	1.4	8.2	0.015	0.004	0.312	0.29	0.282	0.012	0.006	0.014	-	20.7	-	-	-	-
Oct 24	A	11.0	308	3.1	8.2	0.019	0.004	0.290	0.28	0.263	0.009	0.003	0.015	0.10	21.4	-	0.12	-	1.3
	B	10.1	308	3.9	8.2	0.019	0.004	0.306	0.29	0.276	0.009	0.002	0.019	0.14	21.4	-	0.12	-	-
Dec 4	A	4.8	304	5.8	8.2	0.027	0.007	0.331	0.32	0.298	0.014	0.002	0.018	0.24	22.8	-	0.34	198	2.9
	B	4.4	304	5.8	8.3	0.035	0.008	0.354	0.34	0.321	0.014	0.002	0.017	0.31	22.6	-	0.23	198	-

A - Surface Samples

B - Bottom Samples

* - Depth-composite Samples

TABLE 2: Summary of Results, Standard Deviation per Date, 1974, Nanticoke Water Chemistry

DATE		Temp °C	Cond μmhos/cm	Turb FTU	pH SU	Total P mg/l	Diss P mg/l	Tot N mg/l	Tot Kjeld N-mg/l	Tot Org N-mg/l	NO ₃ N-mg/l	NO ₂ N-mg/l	NH ₃ N-mg/l	Tot Iron mg/l	Chloride mg/l	Sulphate SO ₄ -mg/l	Diss Si SiO ₂ -mg/l	Diss Solids mg/l	Chlorophyll* A-mg/l
Apr 24	A	1.35	2.50	1.90	0.609	0.00631	0.00261	0.09073	0.0776	0.0694	0.0330	0.00075	0.00462	0.1203	0.125	-	-	1.54	0.28
	B	1.46	2.74	0.62	0.430	0.00371	0.00313	0.1029	0.0914	0.0898	0.0295	0.00477	0.00836	0.0549	0.122	-	-	1.50	
May 7	A	1.89	-	0.59	0.264	0.00633	0.03490	0.3059	0.3130	0.3108	0.0291	0.00075	0.00547	0.0602	0.294	-	-	1.22	0.34
	B	1.71	-	2.45	0.207	0.00691	0.00508	0.0901	0.08485	0.0848	0.0200	0.00053	0.00	0.1880	0.231	-	-	0.0	
May 22	A	1.00	2.00	3.70	0.4048	0.01074	0.006947	0.1113	0.0644	0.0432	0.0393	0.00167	0.02191	0.2478	0.983	-	-	1.60	0.43
	B	0.85	1.51	4.58	0.153	0.01224	0.01386	0.0784	0.0292	0.0282	0.0496	0.00219	0.00690	0.2866	1.215	-	-	0.81	
Jun 18	A	0.35	4.30	2.82	0.396	0.00772	0.00134	0.0719	0.0524	0.0491	0.0204	0.0	0.00483	0.1806	0.0	0.0	0.532	-	0.44
	B	1.99	2.35	3.21	0.397	0.00786	0.00136	0.0556	0.0393	0.0332	0.0183	0.0	0.00683	0.2015	0.015	0.0	0.336	-	
Jul 5	A	0.79	0.00	2.92	0.187	0.00307	0.00261	0.0399	0.0371	0.0321	0.0688	0.00116	0.00861	0.2011	0.163	0.816	0.098	0.0	0.18
	B	1.78	0.00	0.91	0.107	0.00339	0.00149	0.0293	0.0167	0.0174	0.0195	0.00141	0.00764	0.0894	0.213	0.534	0.095	1.13	
Jul 30	A	0.30	1.34	1.97	0.083	0.01089	0.00558	0.1088	0.1003	0.0969	0.0136	0.00040	0.00408	0.1420	0.200	0.447	0.156	0.50	0.64
	B	2.31	2.48	0.58	0.097	0.00849	0.00443	0.0719	0.0467	0.0980	0.0315	0.00350	0.00367	0.0826	0.663	0.534	0.172	1.83	
Aug 27	A	0.23	1.03	2.97	0.258	-	-	-	-	-	-	-	-	0.1114	0.0	0.930	-	-	0.166
	B	1.03	2.33	0.70	0.183	-	-	-	-	-	-	-	-	0.0752	0.0	0.983	-	-	
Sep 24	A	0.37	1.03	0.19	0.075	0.00389	0.00362	0.0291	0.0292	0.0292	0.00109	0.00516	0.0	-	0.376	-	-	-	0.28
	B	0.33	1.63	0.67	0.151	0.00325	0.00121	0.0471	0.0472	0.0462	0.00095	0.00048	0.00787	-	0.258	-	-	-	
Oct 24	A	0.59	1.26	1.01	0.040	0.00316	0.00063	0.0471	0.0470	0.0516	0.00178	0.00103	0.00548	0.0447	0.204	-	0.040	-	0.46
	B	0.19	1.38	1.41	0.048	0.00151	0.00057	0.0300	0.0293	0.0293	0.00149	0.00048	0.00378	0.0476	0.244	-	0.039	-	
Dec 4	A	1.19	1.50	2.01	0.216	0.00447	0.00183	0.0459	0.0459	0.0454	0.00196	0.00516	0.00274	0.0900	0.408	-	0.247	0.0	0.39
	B	1.37	1.41	2.61	0.0983	0.02358	0.00595	0.0304	0.0302	0.0307	0.00149	0.00037	0.00267	0.1770	0.514	-	0.131	0.0	

A - Surface Samples

B - Bottom Samples

* - Depth-composite Samples

TABLE 3: Summary of Results, Mean Value per Station, 1974, Nanticoke Water Chemistry

STATION		Temp °C	Cond μmhos/cm	Turb FTU	pH SU	Total P mg/l	Diss P mg/l	Tot N mg/l	Tot Kjeld N-mg/l	Tot Org N-mg/l	NO ₃ N-mg/l	NO ₂ N-mg/l	NH ₃ N-mg/l	Tot Iron mg/l	Chloride mg/l	Sulphate SO ₄ -mg/l	Diss Si SiO ₂ -mg/l	Diss Solids mg/l	Chlorophyll* A - mg/l
112	A	12.6	307	2.4	8.1	0.019	0.007	0.410	0.27	0.244	0.126	0.004	0.022	0.11	20.0	24.3	0.19	206	1.1
	B	11.3	309	3.0	8.2	0.018	0.006	0.416	0.30	0.271	0.133	0.006	0.023	0.16	21.8	26.0	0.34	202	
501	A	12.2	307	1.9	8.0	0.014	0.005	0.374	0.25	0.232	0.161	0.004	0.019	0.06	22.3	24.8	0.25	205	1.2
	B	9.9	307	1.9	8.0	0.026	0.009	0.400	0.27	0.251	0.126	0.004	0.024	0.11	21.9	24.8	0.45	205	
518	C	12.9	308	4.7	8.1	0.023	0.008	0.443	0.29	0.268	0.152	0.004	0.019	0.19	21.7	26.0	0.25	205	1.5
648	A	12.7	308	3.0	8.0	0.017	0.006	0.410	0.27	0.253	0.133	0.004	0.019	0.18	21.8	24.7	0.51	207	1.5
	B	12.4	309	3.3	8.1	0.018	0.005	0.420	0.27	0.255	0.144	0.005	0.024	0.12	21.8	25.8	0.42	207	
810	A	13.5	308	4.1	7.9	0.019	0.007	0.431	0.29	0.276	0.133	0.004	0.018	0.23	21.7	26.0	0.44	206	1.1
	B	12.9	309	3.5	7.9	0.019	0.007	0.451	0.31	0.291	0.140	0.004	0.016	0.30	22.0	25.6	0.27	208	
994	A	12.7	307	4.9	8.0	0.034	0.013	0.527	0.39	0.330	0.132	0.005	0.028	0.33	22.0	24.9	0.46	206	1.5
	B	11.7	310	4.6	8.0	0.022	0.006	0.458	0.32	0.301	0.131	0.004	0.022	0.26	22.0	24.9	0.45		
1008	C	10.9	310	4.3	7.9	0.025	0.008	0.416	0.28	0.262	0.131	0.004	0.019	0.28	21.9	24.8	0.46	206	1.3
1016	A	11.9	307	4.5	7.7	0.022	0.008	0.472	0.35	0.329	0.118	0.004	0.021	0.26	21.9	24.9	0.41	206	1.3
	B	10.6	310	3.8	7.8	0.019	0.005	0.455	0.31	0.293	0.135	0.005	0.021	0.23	21.8	24.9	0.40	206	
1040	A	6.7	315	6.8	6.5	0.021	0.004	0.634	0.38	0.360	0.250	0.004	0.020	0.18	23.0	-	-	205	1.4
	B	13.1	309	6.4	8.0	0.028	0.010	0.439	0.30	0.278	0.138	0.005	0.019	0.42	21.6	25.9	0.42	206	

A - Surface Samples

B - Bottom Samples

C - Mid-Depth Samples

* - Depth-composite Samples

TABLE 4: Summary of Results, Standard Deviation per Station, 1974, Nanticoke Water Chemistry

STATION		Temp °C	Cond μmhos/cm	Turb FTU	pH SU	Total P mg/l	Diss P mg/l	Tot N mg/l	Tot Kjeld N - mg/l	Tot Org N - mg/l	NO ₃ N-mg/l	NO ₂ N-mg/l	NH ₃ N-mg/l	Tot Iron mg/l	Chloride mg/l	Sulphate SO ₄ -mg/l	Diss Si SiO ₂ -mg/l	Diss Solids mg/l	Chlorophyll* A - mg/l
112	A	6.68	3.15	1.62	0.181	0.00652	0.00277	0.0992	0.0459	0.0411	0.1057	0.00158	0.01308	0.0688	1.478	3.055	0.143	11.06	0.819
	B	3.69	4.63	1.70	0.089	0.00446	0.00137	0.1405	0.0516	0.0598	0.1136	0.00408	0.01506	0.0572	1.679	1.414	0.205	2.994	
501	A	6.67	3.84	1.15	0.31	0.00464	0.00142	0.0701	0.0327	0.0374	0.0477	0.00158	0.01333	0.0527	1.877	2.630	0.093	11.22	0.73
	B	5.38	3.13	1.19	0.22	0.02609	0.01253	0.0843	0.0364	0.0429	0.0924	0.00145	0.01616	0.095	1.626	2.630	0.374	11.22	
518	C	6.45	2.98	3.69	0.152	0.00967	0.00367	0.1368	0.0543	0.0505	0.1190	0.00212	0.01387	0.1999	1.652	2.160	0.165	9.46	0.68
648	A	6.13	3.81	2.08	0.28	0.00703	0.00339	0.1158	0.0443	0.0394	0.1014	0.00220	0.01341	0.1716	1.431	1.528	0.566	12.00	0.83
	B	5.79	4.21	3.67	0.21	0.00551	0.00200	0.1034	0.0469	0.0469	0.1066	0.00316	0.01446	0.0680	1.475	2.062	0.521	10.76	
810	A	6.03	3.42	3.24	0.49	0.00911	0.00544	0.0853	0.0510	0.0509	0.0957	0.00227	0.0154	0.1564	1.507	2.160	0.498	12.30	0.54
	B	5.95	3.54	2.89	0.403	0.00551	0.0035	0.0828	0.0370	0.0407	0.1038	0.00185	0.01024	0.2188	1.749	2.287	0.192	13.03	
994	A	6.10	4.32	3.03	0.306	0.03654	0.02731	0.2930	0.0245	0.2713	0.0944	0.00224	0.01837	0.1791	1.565	2.394	0.427	10.86	0.89
	B	5.61	4.06	3.03	0.334	0.01045	0.00266	0.1154	0.0685	0.0760	0.0937	0.00198	0.01225	0.1533	1.513	2.394	0.322		
1008	C	5.27	3.12	2.74	0.346	0.00917	0.00574	0.0853	0.0695	0.0652	0.0931	0.00187	0.01210	0.1565	1.294	2.630	0.433	10.94	0.72
1016	A	5.03	4.13	3.00	0.455	0.01026	0.00655	0.1511	0.0741	0.0774	0.1017	0.00200	0.01310	0.1617	1.463	2.394	0.274	2.54	0.81
	B	4.21	1.87	2.42	0.386	0.00447	0.00223	0.1160	0.0563	0.0572	0.0949	0.00381	0.01269	0.1090	1.308	2.394	0.424	11.00	
1040	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.70	
	B	6.40	3.54	4.64	0.318	0.01169	0.00680	0.1215	0.0468	0.0478	0.1129	0.00302	0.01275	0.2368	1.623	1.843	0.325	12.11	

A - Surface Samples
 B - Bottom Samples
 C - Mid-Depth Samples
 * - Depth-composite Samples

TABLE 5: Index of Variation per Date 1974. Nanticoke Water Chemistry

DATE		Temp °C	Cond μmhos/cm	Turb FTU	pH SU	Total P mg/l	Diss P mg/l	Tot N mg/l	Tot Kjeld N-mg/l	Tot Org N-mg/l	NO ₃ N-mg/l	NO ₂ N-mg/l	NH ₃ N-mg/l	Tot Iron mg/l	Chloride mg/l	Sulphate SO ₄ -mg/l	Diss Si SiO ₂ -mg/l	Diss Solids mg/l	Chlorophyll A - mg/l
Apr 24	A	26.1	0.8	62.1	8.2	48.5	52.2	18.4	28.8	26.1	16.1	25.2	25.7	66.8	0.6	-	-	0.8	32.1
	B	29.9	0.9	29.5	5.7	28.5	62.6	20.3	31.5	33.8	13.9	79.6	38.0	45.8	0.5	-	-	0.7	
May 7	A	30.6	-	17.4	3.4	37.2	218.1	48.1	78.3	81.3	12.9	25.1	36.5	37.7	1.3	-	-	0.5	38.8
	B	26.4	-	49.0	2.6	34.6	56.5	16.5	27.4	28.3	9.1	17.2	0.0	53.7	1.0	-	-	0.0	
May 22	A	7.6	0.6	47.4	0.5	35.8	57.9	19.7	20.1	15.7	17.3	23.9	52.3	67.0	4.3	-	-	0.8	27.0
	B	8.1	0.5	53.3	1.9	45.3	92.5	14.8	10.5	11.0	20.1	31.3	32.9	73.5	5.3	-	-	0.4	
Jun 18	A	2.7	1.4	61.3	5.2	40.6	26.8	15.6	17.5	17.2	12.9	0.0	34.5	82.1	0.0	0.0	60.5	-	24.9
	B	16.6	0.8	61.7	5.2	35.8	27.3	12.4	13.6	12.2	11.5	0.0	52.5	74.6	0.0	0.0	37.0	-	
Jul 5	A	5.3	0.0	76.8	2.3	25.6	52.2	9.7	14.8	14.9	44.4	23.4	23.9	80.4	3.2	3.3	44.7	0.0	20.1
	B	14.6	0.0	35.0	1.3	24.2	24.9	6.4	64.5	8.2	10.2	28.3	17.0	42.6	1.1	0.8	41.4	0.6	
Jul 30	A	1.5	0.8	115.9	1.0	60.5	93.1	22.7	30.4	30.3	9.3	8.2	51.0	109.2	0.9	1.6	27.0	0.2	58.5
	B	13.0	0.8	36.3	1.2	38.6	55.4	13.9	14.0	29.2	17.9	70.1	26.2	63.5	2.8	2.0	29.7	0.9	
Aug 27	A	1.0	0.3	141.4	3.4	-	-	-	-	-	-	-	-	79.6	0.0	4.3	-	-	33.3
	B	4.7	0.8	77.8	2.3	-	-	-	-	-	-	-	-	53.8	0.0	4.4	-	-	
Sep 24	A	2.4	0.3	17.9	0.9	21.7	51.8	9.1	9.8	10.2	10.0	8.6	0.0	-	1.8	-	-	-	19.1
	B	2.2	0.5	47.9	1.8	21.7	30.3	15.1	15.1	16.4	7.9	8.1	56.2	-	1.2	-	-	-	
Oct 24	A	5.4	0.4	32.6	1.3	16.6	15.8	16.3	16.8	19.6	19.9	34.4	36.5	44.7	1.0	-	34.0	-	36.1
	B	2.0	0.4	36.2	1.3	8.0	14.4	9.8	10.1	10.6	16.6	24.4	19.9	47.6	1.1	-	32.8	-	
Dec 4	A	24.8	0.5	34.7	2.5	16.6	26.2	13.9	14.4	15.3	14.0	25.8	15.2	37.5	1.8	-	72.9	0.0	13.6
	B	37.3	0.5	45.0	1.1	67.4	74.4	9.2	8.9	9.6	10.7	18.9	15.7	57.1	2.4	-	57.3	0.0	

A - Surface Samples

B - Bottom Samples

C - Depth-composite Samples

TABLE 6: Index of Variation per Station 1974, Nanticoke Water Chemistry

STATION		Temp °C	Cond μmhos/cm	Turb FTU	pH SU	Total P mg/l	Diss P mg/l	Tot N mg/l	Tot Kjeld N-mg/l	Tot Org N-mg/l	NO ₃ N-mg/l	NO ₂ N-mg/l	NH ₃ N-mg/l	Tot Iron mg/l	Chloride mg/l	Sulphate SO ₄ -mg/l	Diss Si SiO ₂ -mg/l	Diss Solids mg/l	Chlorophyll* A - mg/l
112	A	53.1	1.0	67.5	2.2	34.3	39.6	24.2	17.0	15.6	83.9	39.5	59.5	62.5	7.4	12.6	75.6	5.4	74.5
	B	32.7	1.5	56.7	1.1	24.8	23.0	33.8	17.2	21.9	85.4	68.0	65.0	35.8	7.7	5.4	60.5	1.5	
501	A	54.7	1.2	60.5	3.9	33.1	28.5	18.8	13.1	16.1	29.6	39.5	70.2	87.9	8.4	10.6	37.4	5.5	61.4
	B	54.4	1.0	62.6	2.8	100.3	139.2	21.1	13.5	17.1	73.4	36.3	67.3	86.4	7.4	10.6	83.2	5.5	
518	A	50.0	1.0	78.5	1.9	42.0	46.0	30.9	18.7	18.8	78.3	53.2	73.0	105.2	7.6	8.3	66.3	4.6	45.8
	B																		
648	A	48.3	1.2	96.0	3.5	41.4	56.6	28.2	16.4	15.6	76.2	55.1	70.6	95.3	6.6	6.2	111.0	5.8	55.4
	B	46.7	1.4	111.0	2.6	30.6	40.0	24.6	17.4	18.4	74.0	63.2	60.3	56.7	6.8	8.0	124.2	5.2	
810	A	44.7	1.1	79.0	6.2	47.9	77.7	19.8	17.6	18.5	72.0	56.9	85.6	68.0	6.9	1.9	113.2	6.0	49.8
	B	46.1	1.1	82.6	5.1	29.0	50.0	18.4	12.0	14.0	74.1	46.3	64.0	72.9	8.0	8.9	71.3	6.3	
994	A	48.1	1.4	61.8	3.8	93.7	210.0	55.6	6.2	82.2	71.5	44.8	65.6	54.3	7.1	9.6	93.0	5.3	59.8
	B	48.0	1.3	65.9	4.2	47.5	44.5	25.2	21.4	25.3	71.5	49.7	55.7	59.0	6.9	9.6	71.6		
1008	A	48.4	1.0	63.7	4.4	36.7	71.8	20.5	24.8	24.9	71.1	46.8	63.7	55.9	5.9	10.6	94.3	5.3	55.8
	B																		
1016	A	42.3	1.3	66.7	5.9	46.6	61.9	32.0	21.2	23.5	86.2	50.2	62.4	62.2	6.7	9.6	67.0	5.6	62.4
	B	39.8	0.6	63.7	4.9	23.5	44.7	25.5	18.2	19.5	70.3	76.2	60.4	47.4	6.0	9.6	106.1	5.3	
1040	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	B	48.9	1.1	72.5	4.0	40.3	68.0	27.7	15.6	17.2	81.8	60.4	67.1	56.4	7.5	7.1	77.4	5.9	50.6

A - Surface Samples
 B - Bottom Samples
 * - Depth-composite Samples

TABLE 7: Two-Way Analysis of Variance, 1974 Data, Nanticoke Water Chemistry

Parameter	Degrees of Freedom	Between Dates			Significance*	Degrees of Freedom	Between Stations			Significance*
		Table F	Test F	Significance*			Table F	Test F	Significance*	
Temperature	9,8	3.23	339.07	S.D.	8,9	3.39	2.64	N.S.D.		
Conductivity	9,8	3.23	725.55	S.D.	8,9	3.39	3.26	N.S.D.		
Turbidity	9,8	3.23	13.91	S.D.	8,9	3.39	4.96	S.D.		
pH	9,8	3.23	10.69	S.D.	8,9	3.39	2.02	N.S.D.		
Chloride	9,8	3.23	94.63	S.D.	8,9	3.23	0.23	N.S.D.		
Sulphate	3,8	8.84	206.93	S.D.	8,3	4.07	5.35	S.D.		
Iron	8,8	3.44	5.72	S.D.	8,8	3.44	5.06	S.D.		
Diss. Si.	4,8	6.04	21.78	S.D.	8,4	3.84	0.65	N.S.D.		
Diss. Solids	5,8	4.82	1461.52	S.D.	8,5	3.69	3.97	S.D.		
Chlorophyll a	9,8	3.23	28.50	S.D.	8,9	3.39	1.77	N.S.D.		
Total P	8,8	3.44	4.83	S.D.	8,8	3.44	1.29	N.S.D.		
Diss. P	8,8	3.44	3.21	N.S.D.	8,8	3.44	0.83	N.S.D.		
Total N	8,8	3.44	15.32	S.D.	8,8	3.44	1.36	N.S.D.		
Total Org. N	8,8	3.44	1.79	N.S.D.	8,8	3.44	1.63	N.S.D.		
Total Kjeld. N	8,8	3.44	1.11	N.S.D.	8,8	3.44	1.96	N.S.D.		
Nitrate	8,8	3.44	126.94	S.D.	8,8	3.44	1.20	N.S.D.		
Nitrite	8,8	3.44	24.72	S.D.	8,8	3.44	0.78	N.S.D.		
Ammonia	8,8	3.44	30.62	S.D.	8,8	3.44	1.72	N.S.D.		

* Tested at 0.05 probability;

S.D. means significant difference;

N.S.D. means no significant difference.

Table 8

Operation of Nera Environmental
Monitor at Nanticoke 1974

<u>Period of Operation</u>	<u>Depth m</u>	<u>Good Data Days</u>	<u>Comment</u>
Aug. 7-Aug. 12	3.0	3.7	Buoy accident
Aug. 7-Aug. 12	0.2	2.2	
Oct. 10-Oct. 18	0.2	7.2	
Oct. 19-Oct. 25	1.8	5.8	
Oct. 10	Profiling		

TABLE 9: Daily Means, Nanticoke, Station 1040

Date 1974	Depth m	Temperature °C		Dissolved Oxygen mg/l		Dissolved Oxygen % Saturation		Redox Potential mV		pH SU	Conductivity (25°C) μmhos/cm		
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.		Mean	S.D.	
Aug 7	0.25	21.78	0.33	9.28	0.33	105.0	3.4	301.0	48.8	8.59	0.17	314.4	4.0
Aug 7	3.0	20.31	0.26	9.06	0.13	99.5	1.2	276.0	4.6	8.35	0.06	317.3	4.1
Aug 8	0.25	21.82	0.38	9.40	0.17	106.6	2.2	302.2	70.0	8.73	0.14	308.5	4.3
Aug 8	3.00	20.49	0.22	9.26	0.10	102.2	1.4	274.2	2.8	8.41	0.06	312.8	1.6
Aug 9	3.0	21.18	0.13	9.42	0.07	105.2	0.9	264.6	2.1	8.55	0.06	308.1	3.8
Aug 10	3.0	21.67	0.17	9.36	0.15	105.7	1.9	259.2	2.3	8.54	0.07	308.1	1.9
Oct 10	0.3	12.52	0.21	10.03	0.07	93.8	0.9	243.8	10.3	8.29	0.06	307.6	4.0
Oct 11	0.3	12.45	0.14	10.14	0.06	94.7	0.7	246.6	26.4	8.25	0.04	311.5	1.7
Oct 12	0.3	12.14	0.14	10.10	0.13	93.6	1.3	285.3	8.0	8.19	0.09	311.1	3.3
Oct 13	0.3	12.19	0.12	10.27	0.12	95.4	1.0	294.2	5.0	8.25	0.04	312.5	2.4
Oct 14	0.3	12.56	0.11	9.93	0.06	93.0	0.6	295.8	5.4	8.15	0.04	315.8	2.0
Oct 15	0.3	12.44	0.23	9.95	0.04	92.9	0.7	292.3	8.8	8.19	0.07	313.6	5.4
Oct 16	0.3	12.29	0.25	9.99	0.06	93.0	1.0	300.8	4.6	8.21	0.05	311.7	3.8
Oct 19	1.8	10.74	0.24	10.19	0.11	91.6	0.8	291.8	7.9	8.23	0.04	308.5	3.4
Oct 20	1.8	10.47	0.24	10.34	0.10	92.4	0.6	295.7	9.5	8.26	0.05	303.6	2.7
Oct 21	1.8	9.72	0.28	10.72	0.09	94.2	0.6	304.0	9.0	8.26	0.05	310.4	1.8
Oct 22	1.8	9.74	0.20	10.76	0.09	94.6	0.8	292.8	13.9	8.20	0.03	322.5	4.2
Oct 23	1.8	9.93	0.25	10.68	0.06	94.3	0.8	257.7	13.5	8.23	0.06	320.8	3.7
Oct 24	1.8	10.40	0.08	10.65	0.11	95.0	0.8	291.2	11.5	8.24	0.05	315.4	1.4

**TABLE 10: Operating Schedule of the Ontario Hydro
Nanticoke Generating Station in 1974**

Date From	To	Unit			
		1	2	3	4
Jan 1	Jan 30	x	x	x	0
Jan 31	Mar 20	x	0	x	0
Mar 21	Apr 10	0	x	x	x
Apr 11	Apr 17	0	x	x	0
Apr 18	May 15	0	x	x	x
May 16	May 29	0	0	0	x
May 30	Jun 12	x	x	0	x
Jun 13	Jun 19	x	x	x	x
Jun 20	Jun 26	0	x	x	x
Jun 27	Jul 10	x	x	x	x
Jul 11	Jul 31	x	x	x	0
Aug 1	Dec 14	0	0	0	0
Dec 15	Dec 20	0	0	0	x
Dec 21	Dec 31	x	0	x	x

x means unit operational during the given time period

0 means the unit not in operation

Note: Schedule is based on weekly records, the dates given do not necessarily agree with the real date when the unit was put into operation. Some units were running only several hours during the period shown in the Table.

TABLE 11: Results of Kolmogorov-Smirnov Distribution Test

Date 1974	August 7 - 9			August 7 - 12			October 10 - 17			October 19 - 25		
Depth m	0.2			3.0			0.2			1.8		
No. of Points	108			179			344			282		
Distribution	Norm	Expon	Log-norm	Norm	Expon	Log-normal	Norm	Expon	Log-norm	Norm	Expon	Log-norm
Temperature	0.192	0.001	0.170	0.006	0.0	0.009	0.127	0.0	0.063	0.0	0.0	0.0
Diss. Oxygen	0.735	0.001	0.587	0.121	0.0	0.093	0.0	0.0	0.0	0.0	0.0	0.0
Conductivity	0.362	0.001	0.304	0.032	0.0	0.037	0.021	0.0	0.003	0.136	0.0	0.171
Redox Potential	0.012	0.0	0.001	0.013	0.0	0.008	0.0	0.0	0.0	0.0	0.0	0.0
pH	0.625	0.006	0.484	0.044	0.0	0.040	0.002	0.0	0.004	0.011	0.0	0.004

Norm - Normal
 Expon - Exponential
 Log-norm - Log-normal

Table 12: Maximum Values of Time Gradients
of Measured Parameters

Parameter	Date 1974		Depth m	Increase/hr. over Period of		Decrease/hr. over Period of	
	From	To		1 Hour	4 Hours	1 Hour	4 Hours
Temperature °C	August 7	August 11	3.0	0.40	0.18	- 0.40	- 0.24
	August 7	August 9	0.25	0.73	0.19	- 0.90	- 0.22
	October 10	October 17	0.20	0.35	0.17	- 0.25	- 0.13
	October 19	October 25	1.80	0.42	0.15	- 0.30	- 0.15
Dissolved Oxygen mg/l	August 7	August 11	3.0	0.20	0.08	- 0.22	- 0.06
	August 7	August 9	0.25	0.38	0.16	- 0.32	- 0.09
	October 10	October 17	0.20	0.13	0.05	- 0.17	- 0.06
	October 19	October 25	1.80	0.22	0.08	- 0.17	- 0.06
Dissolved Oxygen % Saturation	August 7	August 11	3.0	2.18	0.93	- 2.85	- 0.75
	August 7	August 9	0.25	4.52	1.39	- 3.15	- 1.20
	October 10	October 17	0.20	1.63	0.64	- 1.80	- 0.68
	October 19	October 25	1.80	1.70	0.56	- 1.40	- 0.40
Redox Potential mV	August 7	August 11	3.0	5.50	1.88	- 6.24	- 2.13
	August 7	August 9	0.25	154.0	44.1	-139.5	-29.8
	October 10	October 17	0.20	24.0	10.5	- 28.5	-11.1
	October 19	October 25	1.80	20.5	9.2	- 26.8	-12.7
pH SU	August 7	August 11	3.0	0.15	0.04	- 0.14	- 0.02
	August 7	August 9	0.25	0.22	0.12	- 0.36	- 0.07
	October 10	October 17	0.20	0.06	0.04	- 0.05	- 0.03
	October 19	October 25	1.80	0.09	0.03	- 0.12	- 0.04
Conductivity μmhos/cm	August 7	August 11	3.0	9.5	2.0	- 8.5	- 2.4
	August 7	August 9	0.25	15.0	3.1	- 13.5	- 2.0
	October 10	October 17	0.20	9.5	2.9	- 6.5	- 2.4
	October 19	October 25	1.80	9.0	2.5	- 6.5	- 2.1

TABLE 13: Significant Spectral Periods in Hours

Date	Depth	Temperature		Conductivity		pH		DO		Redox	
		80%	95%	80%	95%	80%	95%	80%	95%	80%	95%
Aug 7 -	3.0	6.86; 3.00	-	3.10; 2.00	-	1.50; 1.33	-	-	-	1.5	-
Aug 11											
Aug 7 -	0.25	5.33; 3.69	2.53; 2.09	4.36; 3.34;	9.60	9.60; 6.00;	16.0	2.82; 2.18	-	5.33; 1.78	16.0; 8.0
Aug 11			1.78	3.00; 2.53;		2.09					3.43
				1.92; 1.71;							
				1.58; 1.45							
				1.33							
Oct 10 -	0.20	-	-	-	-	-	-	16.0	-	9.60; 5.33;	-
Oct 17											2.22
Oct 19 -	1.8	6.4; 1.88	-	-	8.80	12.0; 8.0;	-	2.7	-	2.82; 2.09;	3.20
Oct 25		1.78				4.0					1.95

Note: 80 percent and 95 percent indicate confidence level.

Table 14: Two-Way Analysis of Variance, 1970-1974 Data, Nanticoke

Parameter	Between Years		Between Stations	
	F(4,270)	Significance	F(8,270)	Significance
Conductivity	63.22	S.D.	1.10	N.S.D.
pH	29.28	S.D.	1.42	N.S.D.
Turbidity	6.38	S.D.	3.65	S.D.
Total P	15.72	S.D.	2.63	N.S.D.
Total N	13.78	S.D.	1.62	N.S.D.

S.D. means significant difference

N.S.D. means no significant difference

Table 15: Changes in Water Chemistry 1969-1974, Nanticoke

Parameter	Unit	Mean	Value*	Mean Monthly Change	
				From	To
Conductivity	umhos/cm	317.6	-0.252	-0.163	-0.340
Turbidity	FTU	4.02	-0.008	+0.020	-0.037
pH	SU	8.24	-0.006	-0.002	-0.009
Total P	mg/l	0.0185	-0.00002	+0.00006	-0.00010
Total N	mg/l	0.390	+0.0007	+0.0020	-0.0006

* Negative sign indicates decrease, number is the mean change of the property per month in unit shown.

Appendix I, Table 1, Water Temperature, °C, Nanticoke 1974

Location	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	4.9	4.5	12.7	13.0*	16.0	20.5	22.5	15.8	10.5	5.8	12.6	6.68
	12.0	-	-	10.5		10.5	15.2	-	15.8	10.1	5.8	11.3	3.69
501	1.0	2.7	3.9	11.4	13.0	14.6	20.8	22.8	15.0	11.5	5.9	12.2	6.67
	12.0	2.7	3.9	8.9	8.5	9.6	14.7	20.2	14.9	10.0	5.9	9.9	5.38
518	3.0	7.3	7.8	12.4	13.1	15.6	20.8	23.0	15.0	10.6	3.2	12.9	6.45
648	1.0	5.5	5.0	12.8	13.2	15.9	20.3	22.3	15.7	11.2	5.2	12.7	6.13
	7.0	5.5	5.0	10.5	13.2	14.2	17.5	22.3	15.5	10.5	5.2	12.4	5.79
810	1.0	-	8.0	14.0	13.3	15.2	20.3	22.8	15.0	10.0	3.0	13.5	6.03
	8.0	-	8.0	10.8	13.3	13.2	20.1	22.5	15.0	10.0	3.0	12.9	5.95
994	1.0	5.9	7.8	14.0	12.4	13.9	21.0	22.8	15.0	11.0	3.6	12.7	6.10
	7.0	5.9	7.8	10.6	12.3	11.6	18.3	22.2	15.0	10.0	3.6	11.7	5.61
1008	3.0	5.0	7.4	12.0	13.4	12.6	19.6	-	14.8	11.0	2.3	10.9	5.27
1016	1.0	5.4	7.8	13.6	12.9	15.2	20.3	-	15.2	11.5	5.0	11.9	5.03
	9.0	5.4	7.8	10.8	11.1	12.2	17.8	-	15.2	10.1	5.0	10.6	4.21
1040	1.0	6.7	-	-	-	-	-	-	-	-	-	6.7	-
	3.0	-	6.7	11.8	13.9	14.2	21.0	22.8	15.0	9.8	2.5	13.1	6.40
111	Surface	5.2	6.2	13.1	13.0	15.1	20.5	22.6	15.3	11.0	4.8		
	Bottom	4.9	6.5	10.6	12.0	12.2	17.8	22.0	15.2	10.1	4.4		
Std. Dev	Surface	1.35	1.89	1.00	0.35	0.79	0.30	0.23	0.37	0.59	1.19		
	Bottom	1.46	1.71	0.85	1.99	1.78	2.31	1.03	0.33	0.19	1.37		

mid-depth

APPENDIX I, Table 2, Conductivity, $\mu\text{mhos/cm}$, Nanticoke 1974

station	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	310	-	310	308*	310	310	304	304	308	303	307	3.15
	12.0	-	-	312		310	315	-	304	308	303	309	4.63
501	1.0	310	-	310	300	310	310	304	304	308	303	307	3.84
	12.0	310	-	310	310	310	308	304	304	308	302	307	3.16
518	3.0	310	-	309	310	310	313	304	306	306	305	308	2.98
	1.0	315	-	310	308	310	-	304	304	306	305	308	3.81
648	7.0	315	-	310	308	310	315	306	304	306	304	308	4.21
	1.0	315	-	309	308	310	310	304	306	308	304	308	3.42
810	8.0	315	-	309	310	310	313	304	306	308	-	309	3.54
	1.0	315	-	310	300	310	313	306	304	310	304	307	4.32
994	7.0	310	-	313	315	310	313	306	-	308	304	310	4.06
	3.0	315	-	310	310	310	313	308	306	310	305	310	3.12
1008	1.0	315	-	305	300	310	310	306	306	308	307	307	4.13
	9.0	310	-	310	310	310	313	310	308	310	306	310	1.87
1040	1.0	315	-	-	-	-	-	-	-	-	-	315	-
	3.0	-	-	309	310	310	315	304	306	310	305	309	3.54
Mean	Surface	313	-	309	303	310	311	305	305	308	304		
	Bottom	312	-	310	310	310	313	306	305	308	304		
Std Dev	Surface	2.5	-	2.00	4.3	0.00	1.34	1.03	1.03	1.26	1.50		
	Bottom	2.74	-	1.51	2.35	0.00	2.48	2.33	1.63	1.38	1.41		

*Depth 6.2 m

APPENDIX I, Table 3, Turbidity, FTU, Nanticoke 1974

Station	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev.
112	1.0	2.4	3.6	3.7	2.1*	1.1	0.69	0.7	1.0	4.5	4.4	2.4	1.62
	12.0	-	-	3.6		1.7	1.8	-	1.0	4.7	5.0	3.0	1.70
501	1.0	2.1	2.8	2.4	1.5	1.4	0.64	0.55	0.80	2.6	4.2	1.9	1.15
	12.0	2.0	2.2	1.8	1.5	2.7	0.68	0.70	0.95	2.2	4.7	1.9	1.19
518	3.0	6.5	3.2	13.0	5.8	4.4	1.5	0.20	1.5	3.7	6.9	4.7	3.69
648	1.0	1.8	3.4	10.0	1.6	1.1	-	0.90	1.2	2.3	4.5	3.0	2.88
	7.0	1.5	4.0	13.0	1.6	1.1	2.1	0.75	1.2	2.4	4.9	3.3	3.67
810	1.0	3.2	2.5	10.0	6.6	5.4	1.0	0.20	1.3	3.1	7.9	4.1	3.24
	8.0	3.1	3.0	8.9	7.4	3.3	1.0	0.15	1.4	3.1	-	3.5	2.89
994	1.0	1.7	3.8	11.0	6.3	7.7	5.2	2.0	1.2	4.0	6.0	4.9	3.03
	7.0	1.7	5.3	11.0	6.4	3.7	1.6	1.6	-	4.2	5.8	4.6	3.03
1008	3.0	1.0	2.4	6.2	7.9	2.1	2.4	5.7	3.1	3.4	9.2	4.3	2.74
1016	1.0	2.1	4.0	9.4	7.1	5.9	0.88	8.0	1.3	1.9	4.4	4.5	3.00
	9.0	2.2	7.5	7.9	5.0	2.9	1.4	1.9	1.0	4.2	3.7	3.8	2.42
1040	1.0	6.8	-	-	-	-	-	-	-	-	-	6.8	-
	3.0	-	8.3	14.0	9.5	2.9	2.3	0.3	2.7	6.2	11.0	6.4	4.64
Min	Surface	2.9	3.4	7.8	4.6	3.8	1.7	2.1	1.1	3.1	5.8		
	Bottom	2.1	5.0	8.6	5.2	2.6	1.6	0.9	1.4	3.9	5.8		
Std Dev	Surface	1.80	0.59	3.70	2.82	2.92	1.97	2.97	0.19	1.01	2.01		
	Bottom	0.62	2.45	4.58	3.21	0.91	0.58	0.70	0.67	1.41	2.61		

mid-depth

APPENDIX I, Table 4, pH, SU, Nanticoke 1974

Location	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	7.9	7.9	8.1	7.8*	8.2	8.4	8.0	8.3	8.2	8.3	8.1	0.181
	12.0	-	-	8.2		8.1	8.1	-	8.3	8.2	8.3	8.2	0.089
501	1.0	7.9	7.9	8.1	7.5	8.1	8.3	7.5	8.2	8.2	8.4	8.0	0.31
	12.0	7.9	7.7	8.1	7.7	8.1	8.3	8.0	7.9	8.2	8.3	8.0	0.22
518	3.0	8.0	7.9	7.9	8.0	8.2	8.1	8.0	8.3	8.2	8.3	8.1	0.152
648	1.0	7.9	7.4	8.1	7.8	8.2	-	8.0	8.2	8.2	8.3	8.0	0.28
	7.0	8.0	7.6	8.0	8.1	8.2	8.0	7.9	8.3	8.2	8.3	8.1	0.21
810	1.0	6.7	8.0	8.1	8.0	8.1	8.2	7.5	8.1	8.3	8.3	7.9	0.49
	8.0	7.0	8.0	8.0	8.0	8.1	8.2	7.6	8.2	8.3	-	7.9	0.403
994	1.0	7.7	8.0	8.2	7.3	8.0	8.2	7.9	8.2	8.2	8.3	8.0	0.306
	7.0	7.8	-	8.0	7.4	8.0	8.2	7.6	-	8.2	8.4	8.0	0.334
1008	3.0	7.5	7.5	8.1	7.2	8.0	8.1	8.0	8.1	8.1	8.2	7.9	0.346
1016	1.0	7.1	7.5	8.1	7.0	7.7	8.3	7.5	8.1	8.2	7.8	7.7	0.455
	9.0	7.3	7.9	7.7	7.1	7.9	8.2	7.8	8.1	8.3	8.1	7.8	0.386
1040	1.0	6.5	-	-	-	-	-	-	-	-	-	6.5	-
	3.0	-	8.1	8.0	8.0	8.2	8.1	8.0	8.2	8.2	8.3	8.0	0.318
Mean	Surface	7.4	7.8	8.1	7.5	8.0	8.3	7.7	8.2	8.2	8.2	8.2	
	Bottom	7.6	7.9	8.0	7.7	8.1	8.2	7.8	8.2	8.2	8.2	8.3	
Std. Dev	Surface	0.609	0.264	0.040	0.396	0.187	0.083	0.258	0.075	0.040	0.216		
	Bottom	0.430	0.207	0.153	0.397	0.107	0.097	0.183	0.151	0.048	0.098		

mid-depth

APPENDIX I, Table 5, Dissolved Solids, mg/l, Nanticoke 1974

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Location	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	202	228	202	202	202	-	-	-	-	198	206	11.06
	12.0	-	-	203	202	205	-	-	-	-	198	202	2.94
501	1.0	202	228	202	-	202	202	-	-	-	198	205	11.22
	12.0	202	228	202	-	202	200	-	-	-	198	205	11.22
518	3.0	202	224	201	-	202	203	-	-	-	198	205	9.46
	1.0	205	228	202	-	202	-	-	-	-	198	207	12.00
648	7.0	205	228	202	-	202	205	-	-	-	198	207	10.76
	1.0	-	228	201	-	202	202	-	-	-	198	206	12.30
810	8.0	-	228	201	-	202	203	-	-	-	198	208	13.03
	1.0	205	228	202	-	202	203	-	-	-	198	206	10.86
994	7.0	202	228	203	-	202	203	-	-	-	198		
	3.0	205	228	202	-	202	203	-	-	-	198	206	10.94
1008	1.0	205	231	198	-	202	202	-	-	-	198	206	12.54
	9.0	202	228	202	-	202	203	-	-	-	198	206	11.00
1040	1.0	205	-	-	-	-	-	-	-	-	198	205	-
	3.0	-	228	201	-	202	205	-	-	-	198	206	12.11
Mean	Surface	204	228	201	202	202	202	-	-	-	198		
	Bottom	203	228	202	202	202	203	-	-	-	198		
Std. Dev	Surface	1.54	1.22	1.60	-	0.00	0.50	-	-	-	0.0		
	Bottom	1.50	0	0.81	-	1.13	1.83	-	-	-	0.0		

APPENDIX I, Table 6, Total Phosphorus as P, mg/l, Nanticoke 1974

Station	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	0.018	0.024	0.015F	0.015	0.017	0.012	-	0.016	0.024F	0.033	0.019	0.00652
	12.0	-	-	0.013F	-	0.015	0.024	-	0.016F	0.019F	0.023	0.018	0.00446
501	1.0	0.009	0.019	-	0.011	0.011	0.008	-	0.017	0.018F	0.020	0.014	0.00464
	12.0	0.014	0.015	0.052F	0.012	0.009	0.013	-	0.013	0.017F	0.086	0.026	0.02609
518	3.0	0.010	0.019	0.018F	0.024	0.014	0.034	-	0.015	0.027F	0.039	0.023	0.00967
	1.0	0.017	0.022	0.025F	0.011	0.008	0.014	-	0.014	0.015	0.030	0.017	0.00703
648	7.0	0.011	0.020	0.025F	0.012	0.014	0.026F	-	0.014F	0.018	0.021	0.018	0.00551
	1.0	0.011	0.010	0.038F	0.022	0.011	0.019	-	0.013	0.019F	0.026	0.019	0.00911
810	8.0	0.012	0.025	0.022F	0.023	0.015	0.013	-	0.019	0.021	0.025	0.019	0.00500
	1.0	0.007	0.128	0.042F	0.028	0.013	0.019	-	0.024	0.021F	0.025	0.034	0.00365
994	7.0	0.008	0.018	0.020F	0.030	0.010	0.017	-	0.020	0.020	0.028	0.019	0.00677
	3.0	0.020	0.017	0.037F	0.042	0.025	0.021	-	0.015	0.020	0.028	0.025	0.00917
1008	1.0	0.010	0.010	0.032	0.027	0.014	0.039	-	0.018	0.017	0.028	0.022	0.01026
	9.0	0.018	0.012	0.020F	0.025	0.014	0.023	-	0.014	0.021	0.021	0.019	0.00447
1040	1.0	0.021	-	-	-	-	-	-	-	-	-	0.021	-
	3.0	-	0.031	0.037F	0.028	0.018	0.037	-	0.011	0.020F	0.042	0.028	0.01169
Mean	Surface	0.013	0.017	0.030	0.019	0.012	0.018	-	0.017	0.019	0.027		
	Bottom	0.013	0.020	0.027	0.022	0.014	0.022	-	0.015	0.019	0.035		
Std Dev	Surface	0.00631	0.00633	0.01074	0.00772	0.00307	0.01089	-	0.00389	0.00316	0.00447		
	Bottom	0.00371	0.00691	0.01224	0.00786	0.00339	0.00849	-	0.00325	0.00151	0.02358		

F indicates that analysis was performed on a non-frozen sample.

Appendix I, Table 7, Dissolved Phosphorus, mg/l, Nanticoke 1974

Location	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	0.010	0.007	0.007F	0.005*	0.010	0.002	-	0.008	0.004F	0.008	0.007	0.00277
	12.0	-	-	0.005F		0.008	0.006	-	0.005F	0.004F	0.005	0.006	0.00137
501	1.0	0.006	0.007	0.006F	0.004	0.003	0.003	-	0.004F	0.004	0.004	0.005	0.00142
	12.0	0.010	0.007	0.044F	0.003	0.004	0.004	-	0.005F	0.004F	0.027	0.009	0.01253
518	3.0	0.004	0.004	0.011F	0.008	0.006	0.015	-	0.008	0.004	0.008	0.008	0.00367
648	1.0	0.005	0.012	0.009F	0.003	0.002	0.003	-	0.008	0.004F	0.008	0.006	0.00339
	7.0	0.004	0.008	0.007F	0.003	0.006	0.008F	-	0.004F	0.003F	0.005	0.005	0.00200
810	1.0	0.004	0.005	0.021F	0.006	0.005	0.005	-	0.004F	0.004	0.008	0.007	0.00544
	8.0	0.003	0.015	0.009F	0.006	0.006	0.005	-	0.006	0.005	0.005	0.007	0.0035
994	1.0	0.003	0.121	0.024F	0.006	0.006	0.006	-	0.004F	0.005	0.006	0.013	0.02731
	7.0	0.002	0.007	0.011F	0.005	0.004	0.006	-	-	0.004	0.006	0.006	0.00266
1008	3.0	0.003	0.013	0.020F	0.007	0.013	0.007	-	0.004F	0.003	0.006	0.008	0.00574
1016	1.0	0.002	0.003	0.020F	0.004	0.004	0.017	-	0.008F	0.003	0.009	0.008	0.00655
	9.0	0.004	0.003	0.007F	0.006	0.005	0.010	-	0.003F	0.004	0.006	0.005	0.00223
1040	1.0	0.004	-	-	-	-	-	-	-	-	-	0.004	-
	3.0	-	0.016	0.021F	0.005	0.007	0.017	-	0.003	0.004F	0.011	0.010	0.00680
std Dev	Surface	0.005	0.016	0.012	0.005	0.005	0.006	-	0.007	0.004	0.007		
	Bottom	0.005	0.009	0.015	0.005	0.006	0.008	-	0.004	0.004	0.008		
std Dev	Surface	0.00261	0.03490	0.00694	0.00134	0.00261	0.00558	-	0.00362	0.000632	0.00183		
	Bottom	0.00313	0.00508	0.00138	0.00136	0.00149	0.00443	-	0.00121	0.000577	0.00595		

indicates that analysis was performed on a non-frozen sample.

mid-depth

Appendix I, Table 8, Total Nitrogen, mg/l, Nanticoke 1974

Station	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	0.483	0.553	0.465	0.410*	0.425	0.435	-	0.367	0.242	0.314	0.410	0.0992
	12.0	-	-	0.455		0.505	0.633	-	0.297	0.270	0.334	0.416	0.1405
501	1.0	0.423	0.492	0.385	0.410	0.405	0.395	-	0.309	0.283	0.274	0.374	0.0701
	12.0	0.484	0.532	0.425	0.390	0.435	0.405	-	0.258	0.305	0.364	0.400	0.0843
518	3.0	0.464	0.523	0.689	0.510	0.485	0.455	-	0.247	0.281	0.337	0.443	0.1368
648	1.0	0.494	0.492	0.618	0.370	0.394	0.445	-	0.277	0.251	0.345	0.410	0.1158
	7.0	0.404	0.552	0.587	0.380	0.424	0.522	-	0.310	0.301	0.327	0.420	0.1034
810	1.0	0.402	0.453	0.618	0.470	0.444	0.435	-	0.317	0.364	0.378	0.431	0.0853
	8.0	0.542	0.473	0.587	0.470	0.454	0.455	-	0.328	0.362	0.386	0.451	0.0828
994	1.0	0.414	1.254	0.639	0.520	0.456	0.475	-	0.327	0.272	0.385	0.527	0.2930
	7.0	0.434	0.693	0.518	0.520	0.435	0.495	-	0.347	0.322	0.355	0.458	0.1154
1008	3.0	0.393	0.383	0.528	0.480	0.485	0.505	-	0.316	0.360	0.297	0.416	0.0853
1016	1.0	0.593	0.573	0.567	0.540	0.345	0.696	-	0.317	0.328	0.290	0.472	0.1511
	9.0	0.664	0.473	0.495	0.490	0.448	0.536	-	0.388	0.280	0.317	0.455	0.1160
1040	1.0	0.634	-	-	-	-	-	-	-	-	-	0.634	-
	3.0	-	0.473	0.641	0.440	0.484	0.516	-	0.258	0.301	0.398	0.439	0.1215
Mean	Surface	0.492	0.636	0.564	0.462	0.412	0.480	-	0.319	0.290	0.331		
	Bottom	0.506	0.545	0.530	0.448	0.455	0.509	-	0.312	0.306	0.354		
Std. Dev	Surface	0.0907	0.3059	0.1113	0.0719	0.0399	0.1088	-	0.0291	0.0471	0.0459		
	Bottom	0.1029	0.0901	0.0783	0.0556	0.0293	0.0710	-	0.0471	0.0300	0.0304		

mid-depth

Appendix I, Table 9, Total Kjeldahl Nitrogen N-mg/l, Nanticoke 1974

Location	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev.
112	1.0	0.20	0.27	0.27F	0.25*	0.26	0.30	-	0.35	0.23F	0.30	0.27	0.0459
	12.0	-	-	0.25F		0.28	0.39	-	0.28F	0.26F	0.32	0.30	0.0516
501	1.0	0.19	0.25	0.21F	0.27	0.22	0.26	-	0.29	0.27	0.26	0.25	0.0327
	12.0	0.26	0.29	0.25F	0.25	0.23	0.27	-	0.24	0.29F	0.35	0.27	0.0364
518	3.0	0.18	0.31	0.35F	0.34	0.28	0.30	-	0.23	0.27F	0.32	0.29	0.0543
648	1.0	0.30	0.24	0.34F	0.23	0.22	0.29	-	0.26	0.24	0.33	0.27	0.0443
	7.0	0.17	0.30	0.31F	0.24	0.25	0.31F	-	0.29F	0.29	0.31	0.27	0.0469
810	1.0	0.23	0.24	0.35F	0.30	0.24	0.28	-	0.30	0.35	0.36	0.29	0.0510
	8.0	0.32	0.26	0.29F	0.31	0.26	0.29	-	0.31	0.35	0.37	0.31	0.0370
994	1.0	0.25	1.03	0.39F	0.34F	0.25	0.31	-	0.31	0.26F	0.37	0.39	0.2453
	7.0	0.27	0.48	0.26F	0.34F	0.25	0.32	-	0.33	0.31	0.34	0.32	0.0685
008	3.0	0.15	0.18	0.31F	0.30F	0.32	0.34	-	0.30	0.35	0.28	0.28	0.0695
016	1.0	0.37	0.35	0.33	0.36F	0.32	0.53	-	0.30	0.32	0.27	0.35	0.0741
	9.0	0.42	0.27	0.26F	0.31F	0.27	0.36	-	0.37	0.27	0.30	0.31	0.0563
040	1.0	0.38	-	-	-	-	-	-	-	-	-	0.38	-
	3.0	-	0.26	0.32F	0.27	0.27	0.34	-	0.24	0.29F	0.38	0.30	0.0468
an	Surface	0.27	0.40	0.32	0.30	0.25	0.33	-	0.30	0.28	0.32		
	Bottom	0.29	0.31	0.28	0.29	0.26	0.33	-	0.29	0.29	0.34		
d Dev	Surface	0.0776	0.3130	0.0644	0.0524	0.0371	0.1003	-	0.0292	0.0470	0.0459		
	Bottom	0.0914	0.0848	0.0292	0.0393	0.0167	0.0467	-	0.0472	0.0293	0.0302		

indicates that the analysis was performed on a non-frozen sample.

id-depth ..

Appendix I, Table 10, Total Organic Nitrogen, N-mg/l, Nanticoke 1974

Location	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	0.250	0.250	0.250	0.260*	0.230	0.295	-	0.340	0.210	0.285	0.264	0.0411
	12.0	-	-	0.220		0.230	0.380	-	0.270	0.240	0.300	0.273	0.0598
501	1.0	0.170	0.230	0.200	0.260	0.190	0.255	-	0.280	0.260	0.245	0.232	0.0374
	12.0	0.230	0.280	0.230	0.245	0.180	0.260	-	0.230	0.270	0.335	0.251	0.0429
518	3.0	0.170	0.300	0.310	0.320	0.235	0.290	-	0.220	0.260	0.305	0.268	0.0505
648	1.0	0.280	0.230	0.290	0.220	0.195	0.285	-	0.250	0.220	0.310	0.253	0.0394
	7.0	0.150	0.290	0.290	0.235	0.220	0.265	-	0.280	0.270	0.295	0.255	0.0469
810	1.0	0.220	0.230	0.300	0.285	0.200	0.270	-	0.290	0.340	0.345	0.276	0.0509
	8.0	0.310	0.250	0.270	0.295	0.220	0.285	-	0.300	0.330	0.355	0.291	0.0407
994	1.0	0.230	1.010	0.320	0.320	0.205	0.300	-	0.280	0.240	0.350	0.330	0.2713
	7.0	0.250	0.470	0.240	0.320	0.200	0.310	-	0.300	0.290	0.325	0.301	0.0760
1008	3.0	0.140	0.170	0.280	0.275	0.275	0.330	-	0.290	0.330	0.265	0.262	0.0652
1016	1.0	0.350	0.340	0.290	0.345	0.275	0.515	-	0.290	0.310	0.250	0.329	0.0774
	9.0	0.390	0.260	0.250	0.290	0.220	0.350	-	0.350	0.250	0.280	0.293	0.0572
1040	1.0	0.360	-	-	-	-	-	-	-	-	-	0.360	-
	3.0	-	0.250	0.290	0.255	0.225	0.330	-	0.230	0.280	0.360	0.278	0.0478
Mean	Surface	0.266	0.382	0.275	0.286	0.216	0.320	-	0.288	0.263	0.298		
	Bottom	0.266	0.300	0.256	0.273	0.214	0.336	-	0.282	0.276	0.321		
Std. Dev	Surface	0.0694	0.3108	0.0432	0.0491	0.0321	0.0969	-	0.0292	0.0516	0.0454		
	Bottom	0.0898	0.0846	0.0282	0.0332	0.0174	0.0980	-	0.0462	0.0293	0.0302		

mid-depth

Appendix I, Table 11, Nitrate, N-mg/l, Nanticoke 1974

tion	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev.
12	1.0	0.220	0.280	0.190F	0.157*	0.160	0.130	-	0.010	0.008F	0.012	0.126	0.1057
	12.0	-	-	0.200F		0.220	0.230	-	0.010	0.008F	0.012	0.133	0.1136
01	1.0	0.230	0.240	0.170F	0.137	0.180	0.130	-	0.013	0.011F	0.012	0.161	0.0477
	12.0	0.220	0.240	0.170F	0.137	0.200	0.130	-	0.012	0.012F	0.012	0.126	0.0924
18	3.0	0.280	0.210	0.330F	0.167	0.200	0.150	-	0.011	0.008	0.015	0.152	0.1190
48	1.0	0.190	0.250	0.270F	0.137	0.170	0.150	-	0.010	0.009	0.013	0.133	0.1014
	7.0	0.230	0.250	0.270F	0.137	0.170	0.200F	-	0.013	0.008F	0.014	0.144	0.1066
30	1.0	0.170	0.210	0.260F	0.167	0.200	0.150	-	0.011	0.010	0.015	0.133	0.0957
	8.0	0.220	0.210	0.290F	0.157	0.190	0.160	-	0.012	0.010	0.014	0.140	0.1038
94	1.0	0.160	0.220	0.240F	0.177	0.200	0.160	-	0.011	0.010	0.013	0.132	0.0944
	7.0	0.160	0.210	0.250F	0.177	0.180	0.170	-	0.011	0.010	0.013	0.131	0.0937
08	3.0	0.240	0.200	0.210F	0.176	0.160	0.160	-	0.012	0.008	0.015	0.131	0.0931
16	1.0	0.220	0.220	0.230F	0.177	0.018	0.160	-	0.011	0.006	0.017	0.118	0.1017
	9.0	0.230	0.200	0.230F	0.177	0.170	0.170	-	0.012	0.008	0.015	0.135	0.0949
40	1.0	0.250	-	-	-	-	-	-	-	-	-	0.250	-
	3.0	-	0.210	0.310F	0.167	0.210	0.170	-	0.012	0.009F	0.016	0.138	0.1129
in	Surface	0.206	0.225	0.227	0.159	0.155	0.147	-	0.011	0.009	0.014		
	Bottom	0.212	0.220	0.246	0.159	0.191	0.176	-	0.012	0.009	0.014		
i Dev	Surface	0.0330	0.0291	0.0393	0.0204	0.0688	0.0136	-	0.00109	0.0017	0.0019		
	Bottom	0.0295	0.0200	0.0496	0.0183	0.0195	0.0315	-	0.00095	0.0014	0.0014		

indicates that the analysis was performed on a non-frozen sample.

id-depth

Appendix I, Table 12, Nitrite, N-mg/l, Nanticoke 1974

ation	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. De:
112	1.0	0.003	0.003	0.005F	0.003*	0.005	0.005	-	0.007	0.004F	0.002	0.004	0.00158
	12.0	-	-	0.005F		0.005	0.013	-	0.007	0.002F	0.002	0.006	0.00408
501	1.0	0.003	0.002	0.005F	0.003	0.005	0.005	-	0.006	0.002	0.002	0.004	0.00158
	12.0	0.004	0.002	0.005F	0.003	0.005	0.005	-	0.006	0.003F	0.002	0.004	0.00145
518	3.0	0.004	0.003	0.009F	0.003	0.005	0.005	-	0.006	0.003	0.002	0.004	0.00212
648	1.0	0.004	0.002	0.008F	0.003	0.004	0.005	-	0.007	0.002	0.002	0.004	0.00220
	7.0	0.004	0.002	0.007F	0.003	0.004	0.012F	-	0.007	0.003F	0.003	0.005	0.00316
810	1.0	0.002	0.003	0.008F	0.003	0.004	0.005	-	0.006	0.004	0.003	0.004	0.00227
	8.0	0.002	0.003	0.007F	0.003	0.004	0.005	-	0.006	0.002	0.002	0.004	0.00185
994	1.0	0.004	0.004	0.009F	0.003	0.006	0.005	-	0.006	0.002	0.002	0.005	0.00224
	7.0	0.004	0.003	0.008F	0.003	0.005	0.005	-	0.006	0.002	0.002	0.004	0.00198
1008	3.0	0.003	0.003	0.008F	0.004	0.005	0.005	-	0.004	0.002	0.002	0.004	0.00187
1016	1.0	0.003	0.003	0.007F	0.003	0.007	0.006	-	0.006	0.002	0.003	0.004	0.00200
	9.0	0.014	0.003	0.005F	0.003	0.008	0.006	-	0.006	0.002	0.002	0.005	0.00381
1040	1.0	0.004	-	-	-	-	-	-	-	-	-	0.004	-
	3.0	-	0.003	0.011F	0.003	0.004	0.006	-	0.006	0.002F	0.002	0.005	0.00302
Mean	Surface	0.003	0.003	0.007	0.003	0.005	0.005	-	0.006	0.003	0.002		
	Bottom	0.006	0.003	0.007	0.003	0.005	0.007	-	0.006	0.002	0.002		
std Dev	Surface	0.00075	0.00075	0.00167	0.0	0.00116	0.00040	-	0.00051	0.00103	0.00051		
	Bottom	0.00477	0.00051	0.00219	0.0	0.00141	0.00350	-	0.00048	0.00486	0.00037		

F indicates that the analysis was performed on a non-frozen sample.

*mid-depth

APPENDIX I, Table 13, Ammonia, N-mg/l, Nanticoke 1974

Location	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	0.010	0.020	0.020F	0.010*	0.030	0.005	-	0.010	0.020F	0.015	0.022	0.01308
	12.0	-	-	0.030F		0.050	0.010	-	0.010	0.020F	0.020	0.023	0.01506
501	1.0	0.020	0.020	0.010F	0.010	0.030	0.005	-	0.010	0.010	0.015	0.019	0.01333
	12.0	0.030	0.010	0.020F	0.005	0.050	0.010	-	0.010	0.020	0.015	0.024	0.01616
518	3.0	0.010	0.010	0.040F	0.020	0.045	0.010	-	0.010	0.010	0.015	0.019	0.01387
648	1.0	0.020	0.010	0.050F	0.010	0.025	0.005	-	0.010	0.020	0.020	0.019	0.01341
	7.0	0.020	0.010	0.020F	0.005	0.030	0.045F	-	0.010	0.020F	0.015	0.024	0.01446
810	1.0	0.010	0.010	0.050F	0.015	0.040	0.010	-	0.010	0.010	0.015	0.018	0.0154
	8.0	0.010	0.010	0.020F	0.015	0.040	0.005	-	0.010	0.020	0.015	0.016	0.01024
994	1.0	0.020	0.020	0.070F	0.020	0.045	0.010	-	0.030	0.020	0.020	0.028	0.01837
	7.0	0.020	0.010	0.020F	0.020	0.050	0.010	-	0.030	0.020	0.015	0.022	0.01225
1008	3.0	0.010	0.010	0.030F	0.025	0.045	0.010	-	0.010	0.020	0.015	0.019	0.01210
1016	1.0	0.020	0.010	0.040F	0.015	0.045	0.015	-	0.010	0.010	0.020	0.021	0.01310
	9.0	0.030	0.010	0.010F	0.020	0.050	0.010	-	0.020	0.020	0.020	0.021	0.01269
1040	1.0	0.020	-	-	-	-	-	-	-	-	-	0.020	-
	3.0	-	0.010	0.030F	0.015	0.045	0.010	-	0.010	0.010F	0.020	0.019	0.01275
Mean	Bottom	0.018	0.015	0.040	0.014	0.036	0.008	-	0.010	0.015	0.018		
	Surface	0.022	0.010	0.021	0.013	0.045	0.014	-	0.014	0.019	0.017		
Std. Dev	Bottom	0.00462	0.00547	0.02191	0.00483	0.00861	0.00408	-	0.0	0.00547	0.00273		
	Surface	0.00836	0.00	0.00690	0.00683	0.00763	0.01367	-	0.00786	0.00378	0.00267		

indicates that analysis was performed on a non-frozen sample.

mid-depth.

APPENDIX I, Table 14, Total Iron, mg/l, Nanticoke 1974

Station	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	0.10	-	0.12	0.07*	0.06	0.05L	0.05L	-	0.15	0.24	0.11	0.0688
	12.0	-	-	0.10		0.13	0.18	-	-	0.15	0.25	0.16	0.0572
501	1.0	0.17	0.13	0.05	0.03	0.10	0.05L	0.05L	-	0.05	0.21	0.06	0.0527
	12.0	0.06	0.15	0.08	0.03	0.31	0.05L	0.05L	-	0.05	0.21	0.11	0.095
518	3.0	0.15	0.08	0.88	0.30	0.26	0.29	0.10	-	0.10	0.32	0.19	0.1999
648	1.0	0.10	0.20	0.56	0.04	0.06	-	0.10	-	0.10	0.27	0.18	0.1716
	7.0	0.15	0.18	0.25	0.04	0.06	0.10	0.05	-	0.10	0.12	0.12	0.0680
810	1.0	0.10	-	0.47	0.43	0.35	0.11	0.15	-	0.10	0.16	0.23	0.1564
	8.0	0.18	-	0.64	0.41	0.21	0.09	0.10	-	0.15	0.58	0.30	0.2188
994	1.0	0.18	0.23	0.68	0.28	0.49	0.38	0.15	-	0.15	0.41	0.33	0.1791
	7.0	0.06	0.55	0.40	0.29	0.24	0.11	0.20	-	0.15	0.33	0.26	0.1533
1008	3.0	0.53	0.10	0.25	0.40	0.14	0.25	0.30	-	0.10	0.46	0.28	0.1565
1016	1.0	0.44	0.10	0.36	0.34	0.45	0.06	0.35	-	0.05	0.18	0.26	0.1617
	9.0	0.14	0.34	0.38	0.34	0.30	0.07	0.20	-	0.15	0.18	0.23	0.1090
1040	1.0	0.18	-	-	-	-	-	-	-	-	-	0.18	-
	3.0	-	0.53	0.87	0.53	0.22	0.29	0.20	-	0.20	0.53	0.42	0.2368
Mean	Surface	0.18	0.16	0.37	0.22	0.25	0.13	0.14	-	0.10	0.24		
	Bottom	0.12	0.35	0.39	0.27	0.21	0.13	0.13	-	0.14	0.31		
Std Dev	Surface	0.1203	0.0602	0.2478	0.1806	0.2011	0.1420	0.1114		0.0447	0.0900		
	Bottom	0.0549	0.1880	0.2866	0.2015	0.0894	0.0826	0.0752		0.0475	0.1770		

L indicates that the actual value is less than the recorded one.

mid-depth

APPENDIX I, Table 15, Chloride, mg/l, Nanticoke 1974

Location	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev.
112	1.0	22.8	23.7	22.0	20.0*	19.4	23.3	22.5	20.0	21.5	23.0	20.0	1.478
	12.0	-	-	24.0		19.4	23.1	-	20.5	21.5	22.0	21.8	1.679
501	1.0	23.0	23.6	24.0	20.0	19.4	22.9	-	20.5	21.0	22.0	22.3	1.877
	12.0	23.0	23.7	24.0	20.0	19.4	23.3	22.5	20.5	21.0	22.0	21.9	1.626
518	3.0	22.7	23.4	21.0	20.0	19.0	24.1	22.5	20.5	21.0	23.0	21.7	1.652
648	1.0	23.0	23.6	22.0	20.0	19.4	-	22.5	21.0	21.5	23.0	21.8	1.431
	7.0	22.8	23.4	22.0	20.0	19.0	23.1	22.5	21.0	21.0	23.0	21.8	1.475
810	1.0	22.7	23.1	22.0	20.0	19.0	23.1	22.5	20.0	21.5	23.0	21.7	1.507
	8.0	22.7	23.2	23.0	20.0	19.0	24.8	22.5	20.5	21.5	23.0	22.0	1.749
994	1.0	22.8	23.1	24.0	20.0	19.4	23.3	22.5	20.5	21.5	23.0	22.0	1.565
	7.0	22.8	23.1	24.0	20.0	19.4	23.1	22.5	-	21.5	22.0	22.0	1.513
1008	3.0	22.7	23.2	22.0	20.0	19.4	22.9	22.5	21.5	21.5	23.0	21.9	1.294
1016	1.0	22.8	23.1	23.0	20.0	19.4	23.4	22.5	20.5	21.5	23.0	21.9	1.463
	9.0	22.7	23.1	22.0	20.0	19.4	22.9	22.5	21.0	21.5	23.0	21.8	1.308
1040	1.0	23.0	-	-	-	-	-	-	-	-	-	23.0	-
	3.0	-	23.2	21.0	20.0	19.0	23.8	22.5	20.5	21.5	23.0	21.6	1.623
11	Surface	22.9	23.4	22.8	20.0	19.3	23.2	22.5	20.4	21.4	22.8		
	Bottom	22.8	23.3	22.9	20.0	19.2	23.4	22.5	20.7	21.4	22.6		
Std. Dev.	Surface	0.125	0.294	0.983	0.0	0.163	0.200	0.0	0.376	0.204	0.408		
	Bottom	0.122	0.231	1.215	0.0	0.213	0.663	0.0	0.258	0.244	0.534		

1d-depth

APPENDIX I, Table 16, Sulphate, SO₄-mg/l, Nanticoke 1974

Station	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev.
112	1.0	-	-	-	26.0*	25.0	27.0	21.0	-	-	-	24.3	3.055
	12.0	-	-	-		25.0	27.0	-	-	-	-	26.0	1.414
501	1.0	-	-	-	26.0	25.0	27.0	21.0	-	-	-	24.8	2.630
	12.0	-	-	-	26.0	25.0	27.0	21.0	-	-	-	24.8	2.630
301	3.0	-	-	-	26.0	27.0	28.0	23.0	-	-	-	26.0	2.160
648	1.0	-	-	-	26.0	25.0	-	23.0	-	-	-	24.7	1.528
	7.0	-	-	-	26.0	26.0	28.0	23.0	-	-	-	25.8	2.062
810	1.0	-	-	-	26.0	27.0	28.0	23.0	-	-	-	26.0	2.160
	8.0	-	-	-	26.0	26.0	28.0	22.5	-	-	-	25.6	2.287
994	1.0	-	-	-	26.0	25.0	27.0	21.5	-	-	-	24.9	2.394
	7.0	-	-	-	26.0	25.0	27.0	21.5	-	-	-	24.9	2.394
1008	3.0	-	-	-	26.0	25.0	27.0	21.0	-	-	-	24.8	2.630
1016	1.0	-	-	-	26.0	25.0	27.0	21.5	-	-	-	24.9	2.394
	9.0	-	-	-	26.0	25.0	27.0	21.5	-	-	-	24.9	2.394
1040	1.0	-	-	-	-	-	-	-	-	-	-	-	-
	3.0	-	-	-	26.0	26.0	28.0	23.5	-	-	-	25.9	1.843
Mean	Surface	-	-	-	26.0	25.0	27.2	21.8	-	-	-		
	Bottom	-	-	-	26.0	25.4	27.4	22.2	-	-	-		
Std Dev	Surface	-	-	-	0.0	0.816	0.447	0.930	-	-	-		
	Bottom	-	-	-	0.0	0.534	0.534	0.983	-	-	-		

mid-depth

APPENDIX I, Table 17, Dissolved Silica, mg/l, Nanticoke 1974

tion	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev
112	1.0	-	-	-	1.0*	0.10	0.40	-	-	0.10	0.15	0.19	0.143
	12.0	-	-	-		0.30	0.60	-	-	0.10	0.35	0.34	0.205
501	1.0	-	-	-	0.35	0.20	0.35	-	-	0.20	0.15	0.25	0.093
	12.0	-	-	-	1.10	0.20	0.40	-	-	0.20	0.35	0.45	0.374
518	3.0	-	-	-	0.25	0.30	0.50	-	-	0.10	0.10	0.25	0.165
648	1.0	-	-	-	1.30	0.10	-	-	-	0.10	0.55	0.51	0.566
	7.0	-	-	-	1.30	0.10	0.50	-	-	0.10	0.10	0.42	0.521
810	1.0	-	-	-	1.30	0.30	0.40	-	-	0.10	0.10	0.44	0.498
	8.0	-	-	-	0.45	0.20	0.50	-	-	0.10	0.15	0.27	0.192
994	1.0	-	-	-	1.20	0.30	0.30	-	-	0.10	0.40	0.46	0.427
	7.0	-	-	-	0.95	0.20	0.55	-	-	0.15	0.40	0.45	0.322
1008	3.0	-	-	-	1.20	0.20	0.40	-	-	0.10	0.40	0.46	0.433
1016	1.0	-	-	-	0.25	0.30	0.70	-	-	0.10	0.70	0.41	0.274
	9.0	-	-	-	1.10	0.20	0.50	-	-	0.10	0.10	0.40	0.424
1040	1.0	-	-	-	-	-	-	-	-	-	-	-	-
	3.0	-	-	-	0.55	0.40	0.90	-	-	0.10	0.15	0.42	0.325
an	Surface	-	-	-	0.88	0.22	0.43	-	-	0.12	0.34		
	Bottom	-	-	-	0.91	0.23	0.58	-	-	0.12	0.23		
d Dev	Surface				0.532	0.098	0.156			0.040	0.247		
	Bottom				0.336	0.095	0.172			0.039	0.131		

mid-depth

APPENDIX I, Table 18, Chlorophyll A*, Nanticoke 1974

Station	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev.
112		0.7	0.3	1.0	1.3	0.9	0.6	0.3	1.9	1.0	3.0	1.1	0.81
501		1.2	0.5	1.0	1.3	1.1	0.7	0.3	1.2	1.4	3.0	1.2	0.73
518		1.4	1.0	2.1	1.5	0.9	1.8	0.3	1.6	1.3	2.8	1.5	0.68
648		0.8	1.2	1.7	1.5	0.8	1.0	0.4	2.0	1.9	3.3	1.5	0.83
810		0.5	1.2	1.7	1.5	1.1	0.7	0.4	1.4	0.8	2.1	1.1	0.54
994		1.2	0.8	2.3	2.6	0.9	1.5	0.7	1.2	0.8	3.3	1.5	0.89
1008		0.8	1.4	1.5	2.0	0.6	1.1	0.6	1.4	0.7	2.9	1.3	0.72
1016		0.8	0.9	1.6	2.2	0.8	0.3	0.7	1.5	1.6	3.0	1.3	0.81
1040		0.8	1.0	1.6	1.9	0.6	2.3	0.4	1.3	1.9	2.4	1.4	0.70
Mean		0.9	0.9	1.6	1.8	0.9	1.1	0.5	1.5	1.3	2.9		
Std Dev		0.28	0.34	0.43	0.44	0.18	0.64	0.16	0.28	0.46	0.39		

*Depth composite samples

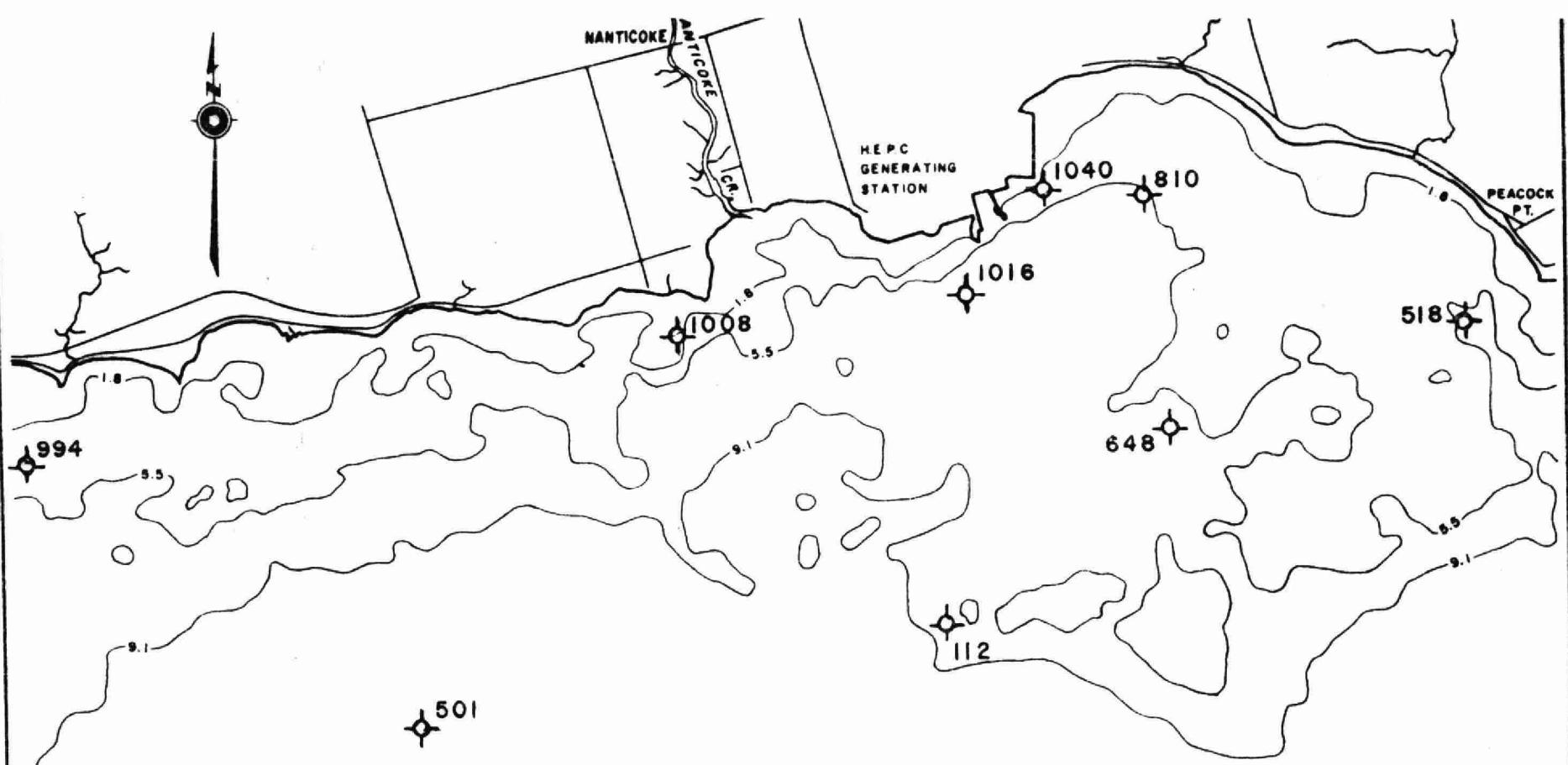
APPENDIX I, Table 19, Phenols, $\mu\text{g/l}$, Nanticoke 1974

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Con	Depth-m	Apr 24	May 7	May 22	Jun 18	Jul 5	Jul 30	Aug 27	Sep 24	Oct 24	Dec 4	Mean	Std. Dev.
	12	1.0											
	12.0												
	10	1.0											
	12.0												
	18	3.0											
	18	1.0											
	7.0												
	10	1.0											
	8.0												
	9.4	1.0											
	7.0												
	08	3.0											
	16	1.0											
	9.0												
	40	1.0											
	3.0												
	Surface												
	Bottom												
Dev	Surface												
	Bottom												

ALL VALUES LOWER THAN 1.0 $\mu\text{g/l}$

d-depth

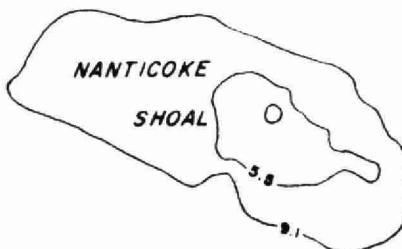


NOTE: DEPTH CONTOURS IN METERS

LEGEND

♦ - SAMPLING STATION

LAKE ERIE
(LONG POINT BAY)



ENVIRONMENT ONTARIO

FIGURE: I
NANTICOKE SAMPLING STATIONS

1974

SCALE:	0	1	2 KM
DRAWN BY: A.R.S.	DATE: FEB. 1975		
CHECKED BY:	DRAWING NO: 5402		

FIGURE 2 : 1969 - 1974 VARIATION OF CONDUCTIVITY

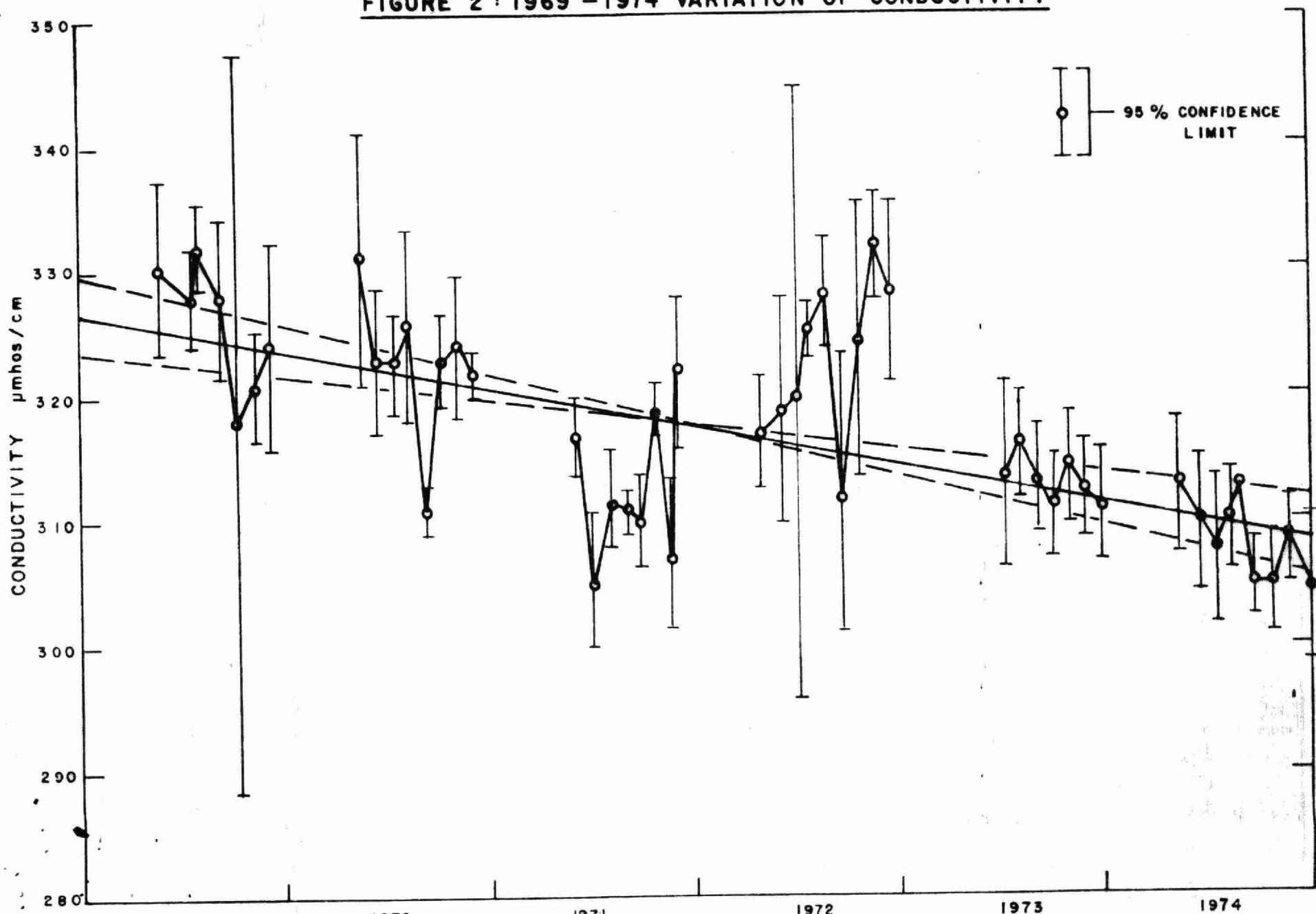
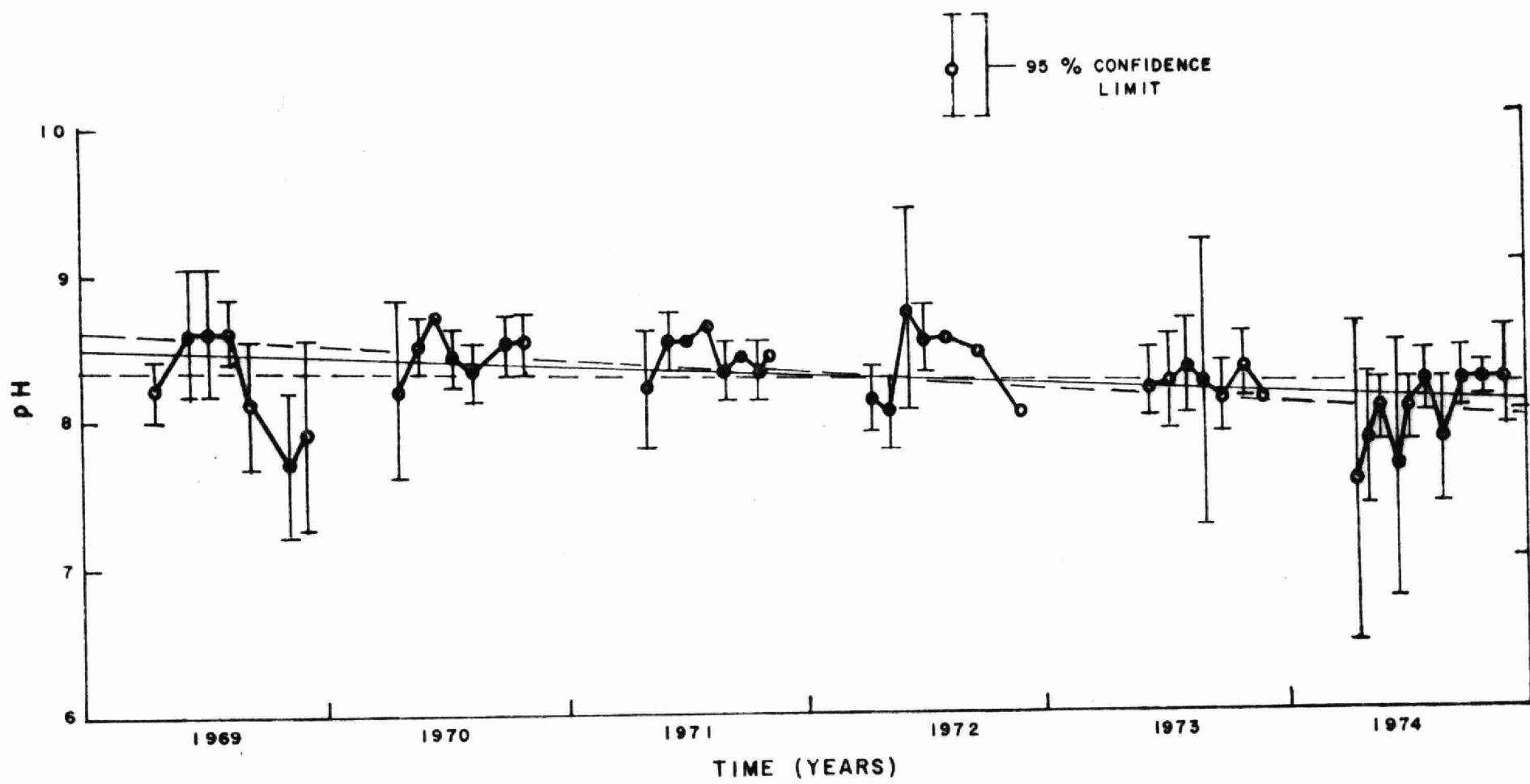
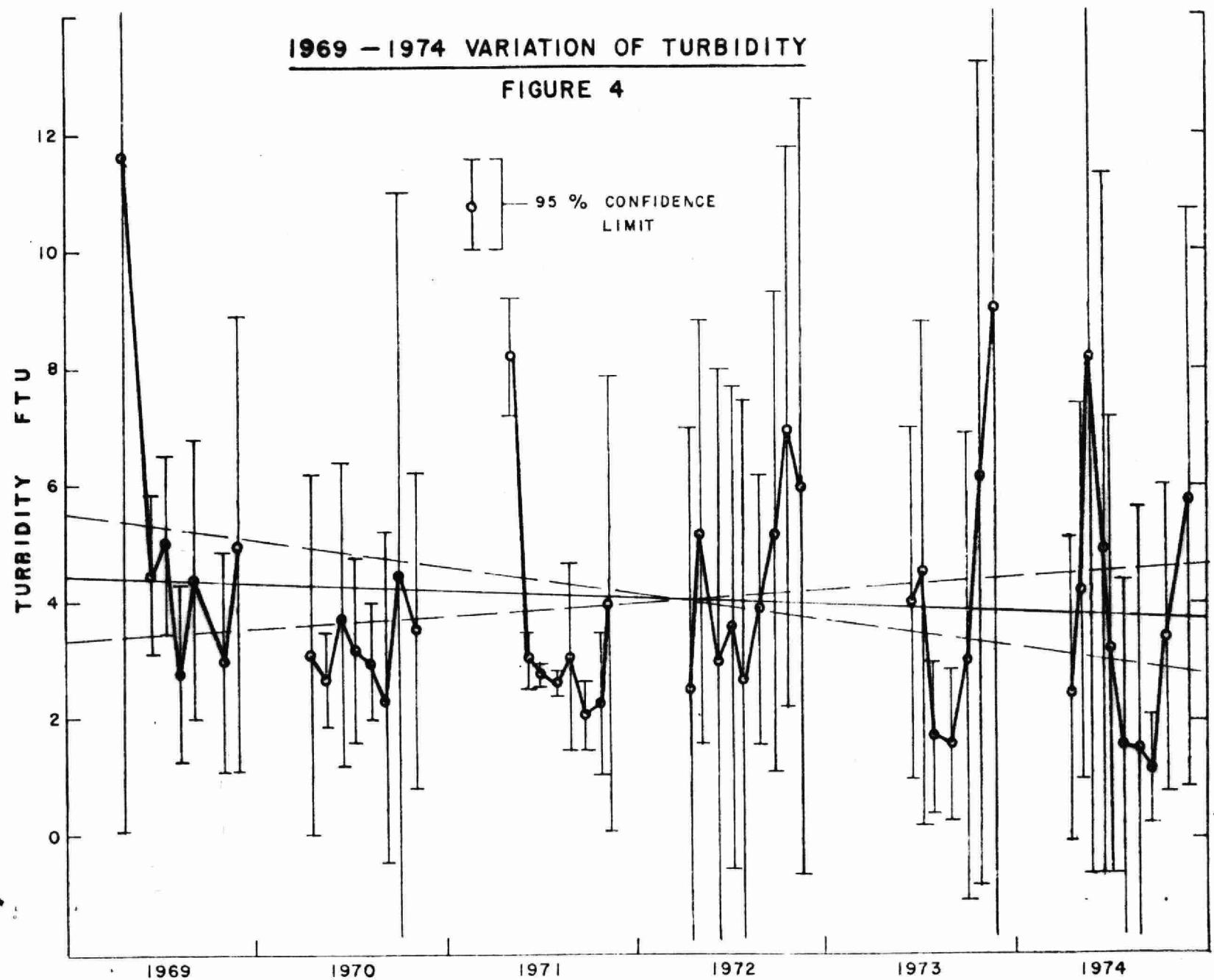


FIGURE 3: 1969 - 1974 VARIATION OF pH



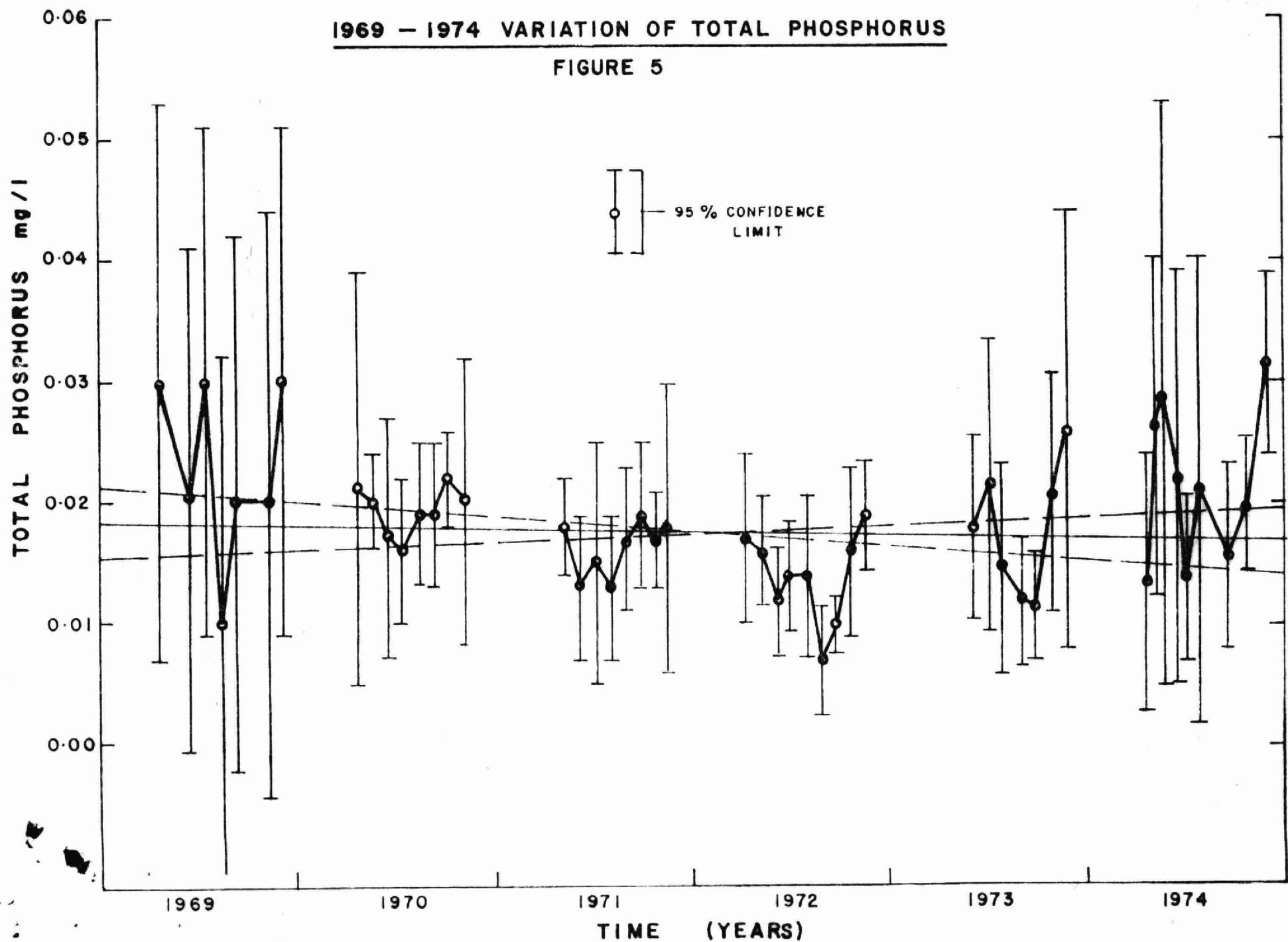
1969 - 1974 VARIATION OF TURBIDITY

FIGURE 4



1969 - 1974 VARIATION OF TOTAL PHOSPHORUS

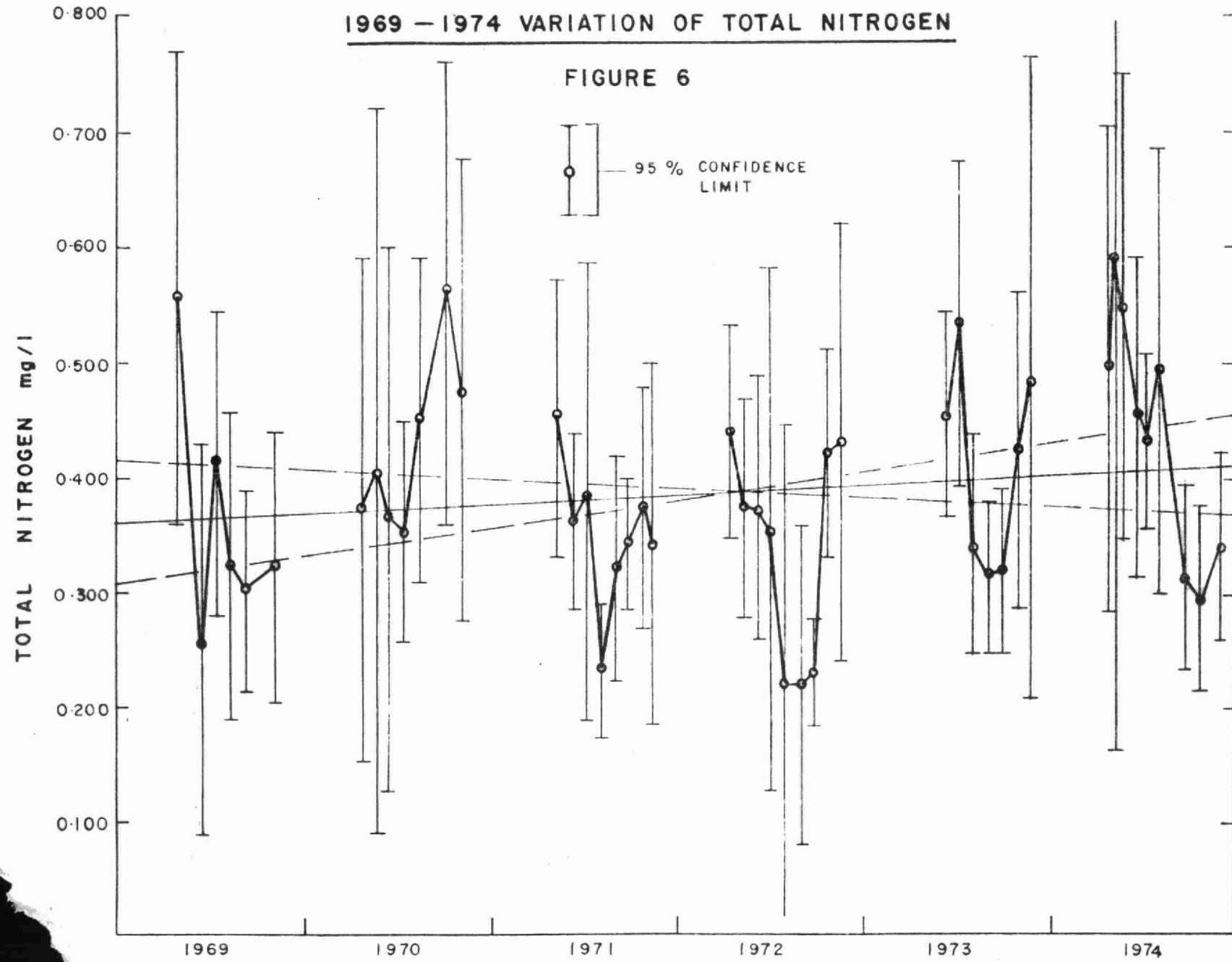
FIGURE 5



1969 - 1974 VARIATION OF TOTAL NITROGEN

FIGURE 6

95 % CONFIDENCE
LIMIT





96936000008072

TERMINAL STREAM: SYDENHAM R.

100

—CAT. No. 23-115

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